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GRADUATE SCHOOL

UNITED STATES DEPARTMENT OF AGRICULTURE

BULLETIN



GRADUATE AND UNDERGRADUATE STUDY

Catalog Issue 1949-50

WASHINGTON ~ AUGUST 1949

This Bulletin, published annually by the Graduate School, covers graduate and undergraduate programs for the Fall and Spring Semesters and the Summer Session. It is made as accurate as possible, but the right is reserved to make changes in details as circumstances require. A bulletin on correspondence study is available to field employees of the Department of Agriculture.

Calendar for the 29th School Year, 1949-1950

Fall Semester

September 10—Registration begins

September 17—Last day of registration without payment of extra fee

September 19, Monday—Fall Semester begins

September 19 to 23—All classes begin unless other date is given in Schedule of Classes

September 30—Last day of registration for credit

September 30, Friday—End of refund period and last day of registration transfer without payment of extra fee

November 4—Last day to make deferred payments

November 11, Armistice Day—No classes

November 24, Thanksgiving holiday—No classes

December 17, Saturday—Christmas holidays begin; no classes

January 3, Tuesday—Classes resume after holidays

January 13, Friday—Close of Fall Semester *

Spring Semester

January 28—Registration begins

February 4—Last day of registration without payment of extra fee

February 6, Monday—Spring Semester begins

February 6 to 10—All classes begin unless other date is given in Schedule of Classes

February 17—Last day of registration for credit

February 17, Friday—End of refund period and last day of registration, or registration transfer without payment of extra fee

February 22, Washington's Birthday—No classes

March 24—Last day to make deferred payments

May 19, Friday—Close of Spring Semester *

Summer Session

May 31—Registration begins

June 3—Last day of registration without payment of extra fee

June 5 to 9—All classes begin unless other date is given in Schedule of Classes

* Classes which have missed sessions because of the restoration of holidays in the Federal service or for any other reason will continue until deficiency is made up.

Business Office—Room 1031, South Agriculture Building
Between 12th and 14th on Independence Avenue, SW.
Hours—9:00 A.M. to 6:20 P.M., Monday through Friday
Telephone—Republic 4142, Extension 6337

GRADUATE SCHOOL

UNITED STATES DEPARTMENT OF AGRICULTURE

BULLETIN

FALL — SPRING — SUMMER

1949 — 1950



*Please keep this catalog for use in
the Spring and Summer. New copies
will not be available at that time.*

WASHINGTON ~ AUGUST, 1949

Contents

	PAGE
General Information	
History and Objectives	5
Administration	6
Program of the Graduate School	7
Publications	10
Counseling Service	11
Library Facilities	11
Accreditment	12
General Graduate Degree Requirements	12
Certified Statements of Accomplishment	13
Cooperative Arrangements	
University of Maryland	9
Catholic University of America	97
Regulations and Procedures	
Admission	14
Veterans	14
Entrance Requirements	14
Course Prerequisites	14
Classification of Courses	15
Registration Regulations	15
Attendance at Classes	15
Withdrawal	16
Credit and Grades	16
Transfer of Credit	16
Fees	17
Refund of Fees	17
Textbooks	18
Departments of Instruction	
Biological Sciences	19
Languages and Literature	22
Mathematics and Statistics	33
Office Techniques and Operations	46
Physical Sciences	55
Public Administration	61
Social Sciences	79
Technology	105
Faculty	117
Index	134

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General Information

HISTORY AND OBJECTIVES

The Organic Act which established the Department in 1862 laid upon it the duty of acquiring and diffusing useful information "on subjects connected with agriculture in the most general and comprehensive sense of the word." It was evident that the quality of its service would depend greatly on the professional preparation of its employees. The need for qualified personnel became more acute after World War I. Consequently, the Congressional Joint Committee on the Reclassification of Salaries recommended that the Government departments give more attention to the development of opportunities within the Federal Service for continued education. Accordingly, the Secretary of Agriculture appointed a special committee to find ways of helping Department employees advance professionally and improve their service to Agriculture. After consulting other Government agencies and leading educational institutions, the Secretary in 1921 established the Department's Graduate School.

In its twenty-eight years of meeting the changing educational needs of Federal employees, the School has served as a graduate school, an in-service-training institute, and an adult education organization. It has grown, in its resident program, from 10 courses and about 300 students to over 300 courses and more than 5,000 students.

The Graduate School has become a unique agency, at once an educational and service institution. First, it serves to develop and coordinate resources of the Department for educational needs; and, secondly, it functions as a link between the Department and other educational institutions which can use the Department's facilities and resources to advantage in training young men and women. President Truman, in recognizing the 25th anniversary said that the Graduate School ". . . has proved to be one of our most significant and productive instruments for better government."

The major objectives and functions are stated in the regulations issued by the Secretary of Agriculture which govern the Graduate School:

". . . Such activities shall include, but shall not be necessarily limited to, organizing, coordinating or administering, or rendering assistance therein, in cooperation with the several bureaus of the Department, and where appropriate other departments and agencies:

1. Graduate education for the convenience of employees who desire advanced degrees but find it difficult, both for personal and official reasons, to complete all study in residence at another institution;

2. Educational and experience opportunities in those subjects and areas in which the Department and Government have unique facilities and resources;
3. Cooperative programs with the land-grant and other institutions and agencies under which members of these institutions and agencies may utilize to advantage educational and experience opportunities represented by the unique facilities and resources of the Department and Government;
4. Programs under which Department employees may take advantage of educational and experience opportunities, related to their work in the Department, at the land-grant and other institutions and agencies;
5. Educational opportunities for employees to train themselves, on their own time and at their own expense, for proficiency in their present positions and for advancement to positions of greater responsibility;
6. Opportunities for professional, administrative and technical employees to keep abreast of latest developments in their respective fields so that they may perform more effectively the responsibilities assigned to them;
7. Cultural, creative and leisure time opportunities;
8. Cooperation, on behalf of the Department, with other departments and agencies in undertakings designed to develop, through educational activities, the improvement of the service and the increasing of employee usefulness."¹

ADMINISTRATION

The organization and administration of the Graduate School are simple and effective. The government of the Graduate School is vested in a General Administration Board appointed by the Secretary of Agriculture. Functions of this Board, made up of administrative and scientific officials of the Department, correspond in general to those of boards of trustees of universities. The Board sets policy, serves as the reviewing and approving authority in connection with the annual budget, and functions generally with respect to problems at this level. The School is administered by a director and a small administrative staff. It is a self-supporting non-profit institution and receives no Federal funds.

Both the formal educational programs and activities of an educational service nature are organized and supervised by committees composed of persons with broad backgrounds and recognized competence. Membership in these committees is drawn from agencies throughout the Federal service as well as from universities and other sources. The resident program in Washington is organized into eight departments. The departmental committees, with assistance of subcommittees, are charged with the responsibility of

¹ "United States Department of Agriculture Regulations Governing the Graduate School of the Department of Agriculture Promulgated Pursuant to the Authority Contained in the Act of May 15, 1862 (R. S. § 520 (1878), 5 U. S. C. § 511 (1940)), the Joint Resolution of April 12, 1892, 27 Stat. 395, and the Deficiency Appropriation Act of March 3, 1901, 31 Stat. 1010, 1039 (20 U. S. C. Sec. 91 (1940))." (Revised February 21, 1947.)

organizing, evaluating, readjusting, and giving general administrative direction to the programs for which they are responsible.

As needs dictate, special committees may be appointed to study various phases of Graduate School activity. In this post-war period the Graduate School has been increasingly conscious of the need for re-examining its role in and service to the Department of Agriculture and for setting up long-range plans. These plans must insure that the School's resources and activities are directed in channels through which it can help most effectively to meet the educational needs of the Department.

Thus, in June, 1948, a special committee was appointed to study the program and the role of the Graduate School in the work of the Department. Three of the committee members were from the Department; they represented operating agencies, staff agencies and research agencies in both the natural and social sciences. Of the non-Department members, one was from a land-grant institution, the other from the Office of Education. This committee, with the assistance of the faculty, departmental committees, and the several United States Department of Agriculture agencies, made a thorough study of all Graduate School services. The recommendations made by this committee have been accepted by the General Administration Board and by the Secretary of Agriculture. When these recommendations can be implemented, they will greatly influence the direction of future Graduate School activities.

PROGRAM OF THE GRADUATE SCHOOL

Organized, formal educational programs in the Graduate School center in Washington, where opportunities are provided for graduate and undergraduate work. The educational needs of field employees usually are met by enlisting the cooperation of local institutions. In some cases, however, such needs are met through short courses or institutes for groups of employees. Correspondence study aids Agriculture employees in isolated areas or in subjects not otherwise covered.

The Graduate School also helps to coordinate the educational interests of the Department's bureaus. It affords means whereby graduate students and faculty members from land-grant and other institutions may use the Department's research resources. It cooperates in the assistance given by the Department in the orientation and training of students from foreign countries, of agricultural attaches, and of university and Federal officials in special fields such as marketing and public administration and carries on other related functions and activities.

The Graduate School cooperates with other educational institutions throughout the country. This cooperation may have many facets. It may include, with institutions in the same geographical area, the joint offering of courses, the sponsoring of lectures, or joint assignments for faculty members. With other institutions the cooperation may include mutual aid in program development, study of courses in particular fields, and strengthening of the curriculum as the need appears. The type and the extent of the cooperation correspond as nearly as possible to the requirements of the students and the facilities of the cooperating institutions.

RESIDENT EDUCATIONAL PROGRAM IN WASHINGTON

The curricula consist chiefly of courses in the biological, physical and social sciences, in languages and literature, in mathematics and statistics, in public administration, in Federal clerical and administrative techniques, and in the mechanical arts. It is these curricula to which this BULLETIN is devoted. They reflect the interests and needs of the Federal service in various levels and types of work. Seminars or lecture series with discussion facilities are provided for advanced graduate students and for the higher scientific and administrative officials. Other courses in the arts and sciences provide Federal employees with broad opportunities for continuation study along the lines of their general interest as individuals as well as their special interests as employees. The curriculum is planned to enable students to continue their work toward undergraduate and graduate degrees.

The program of the School is based on the belief that work and study can be combined to the advantage of both, work giving meaning and motive to the learning process, and study supplying understanding and competence to the work situation. The School also operates in the conviction that after-work activities and off-the-job environment have a vital relation to morale and performance on the job. Given after hours and at the students' own expense, courses are open to the employees of other Government agencies, and to non-Federal persons as well, to the extent that the facilities permit.

PUBLIC LECTURES AND SEMINARS

Lecture series on current problems serve Department employees and others by giving them an opportunity for closer acquaintance with the problems that are constantly arising, not only in the field of agriculture but in other national and world affairs. Those lectures which are especially geared to the needs and interests of Agriculture employees are given during official working hours. No reg-

istration is required and no fees are charged. Information about lectures planned for 1949-50 will be found in sections of this BULLETIN devoted to the several departments of instruction. During the course of the year, special announcements on these and other lectures will be issued.

During 1948-49 special lectures were provided on current problems of national policy. One series of lectures, Resource Utilization and Conservation, given by nationally known authorities, dealt with major conditions, problems and policies arising in the resource field. Three series of public lectures, given by outstanding authorities in the different subjects presented, were in the field of international relations. These included a series of lectures on The Foreign Policies—Past and Present—of the Great Powers; Economic Recovery and World Politics; and Latin America, presented jointly with the Pan American Union.

Authorities of national and international standing participated in other technical lectures and seminars sponsored by the various departments of instruction.

COOPERATION WITH UNIVERSITY OF MARYLAND

To provide broader educational opportunities for those served by each institution, the Graduate School of the United States Department of Agriculture and the University of Maryland have developed a cooperative arrangement under which certain resources of each institution are made available to students of both institutions. Representatives of certain subject matter departments at each institution are engaged in developing integrated educational programs.

Under these arrangements, work taken at the Graduate School of the United States Department of Agriculture may be applied as partial residence credit toward undergraduate or advanced degrees at the University of Maryland. Those wishing to take advantage of this arrangement must work out an approved program of study in consultation with appropriate officials at the University of Maryland. This should be done at a point as early as possible in their programs.

Graduate School students wishing to take advantage of these opportunities may secure instructions from the Registrar.

COOPERATIVE INTERNSHIP PROGRAM WITH LAND-GRANT INSTITUTIONS

Post-graduate and post-doctorate personnel in Land-Grant Colleges and Universities are afforded opportunities for research and for gaining other desirable experience under a program developed

jointly by a committee from the Graduate Council of the Association of Land-Grant Colleges and Universities and the Graduate School. This work is under the direction of the Department of Agriculture professional staff in Washington, Beltsville and elsewhere. Specific arrangements under this program are between personnel from these educational institutions and agencies in the Department.

GRADUATE SCHOOL PUBLICATIONS

Publications of the Graduate School include:

1. A general annual BULLETIN which contains detailed information about the resident educational program in Washington, D. C.

2. Time Schedule and Supplement, published each semester—fall, spring and summer—which carries added details about the resident educational program in Washington.

3. Books and periodicals, published at irregular intervals containing: original contributions by faculty members; special lectures on subjects devoted to the advancement of the arts, the sciences, and in particular to the development of literature in the field of better government; and significant manuscripts prepared by employees of the Department of Agriculture, which the Department has been unable to publish. A partial list of these publications is given on the outside back cover of this BULLETIN.

FACULTY

The School has always emphasized the human, non-physical element—teachers and students—in the educational process. The faculty is drawn almost entirely from the Federal service, a source of talent and expertness unexcelled anywhere in the nation. Professional competence is the sole criterion of selection. Faculty members combine excellent academic training, college teaching experience, and daily practice in the application of the subject matter taught.

The tradition of a strong faculty in the Graduate School dates from its first year. The following men comprised the initial staff of ten:

Natural Sciences

*Dr. C. O. Appleman, retired, formerly Dean of the Graduate School, University of Maryland.

*Dr. Burton E. Livingston, Professor Emeritus of Plant Physiology, Johns Hopkins University.

*Dr. C. L. Shear, retired, formerly Principal Pathologist in charge of Mycology and Disease Survey, USDA.

* Starred in *American Men of Science* for distinction in his special field.

*Dr. Richard C. Tolman, Professor of Physical Chemistry and Mathematical Physics, California Institute of Technology.

*Dr. Edgar T. Wherry, Professor of Botany, University of Pennsylvania.

*Dr. Sewall Wright, Burton Distinguished Service Professor of Zoology, University of Chicago.

Social Sciences

Dr. Alexander E. Cance, Professor Emeritus of Economics, University of Massachusetts.

Dr. Henry C. Taylor, Agricultural Economist, Farm Foundation.

Mr. Howard R. Tolley, Director, Economics and Statistics Division, Food and Agriculture Organization of the United Nations.

Dr. Oscar C. Stine, Assistant Chief for Prices, Income and Marketing, Bureau of Agricultural Economics, USDA.

COUNSELING SERVICES

Careful planning is important for any prospective student, but particularly so for the Federal employee who wishes to make a substantial beginning in his educational program through the Graduate School, where degrees are not granted and credits must eventually be transferred to a degree-conferring institution.

The most vital factor in studying for a degree is the setting up of a program which includes a group of logically related courses in a special field of scientific or professional study. It is essential that the student have general knowledge of the scope of the field in which he is working or in which he plans to secure his degree. Unless his courses are reasonably related to form an organic field of study, he may be disappointed in the amount of credit which will be granted him when he transfers to another school.

Officers of the Graduate School are available, throughout the registration periods and from 9:00 a.m. to 5:00 p.m. each day for counseling on educational plans, whether courses are to be pursued in the Graduate School or in other institutions. In addition, where necessary, arrangements are made to refer persons having special problems to authorities in the particular field of work or study.

LIBRARY FACILITIES

The Department of Agriculture Library, containing over half a million books, is the Graduate School Library. It is open to students from 8:30 a.m. to 8:30 p.m., Monday through Friday, and

* Starred in *American Men of Science* for distinction in his special field.

9:00 a.m. to 1:00 p.m. on Saturdays. Special collections of books, designated as required reading by the instructors, are available for use in the Reading Room or for circulation to Graduate School students. Other libraries in the District—The Library of Congress, public libraries and libraries of Government agencies, offer excellent opportunities for study and research.

ACCREDITMENT

The Graduate School does not grant degrees and has never sought that authority; therefore it has not asked to be accredited by any of the accrediting agencies. It prefers to give courses of standard graduate and undergraduate grade; to have the merits of these courses judged by the caliber and well-known competence of its instructors; and to cooperate with existing institutions having degree-granting authority.

The United States Civil Service Commission accepts Graduate School credits, the same as those from accredited colleges and universities, for examination and qualification purposes.

GENERAL GRADUATE DEGREE REQUIREMENTS

Graduate students should arrange their programs in advance through the dean of the graduate school of the institution from which the student contemplates taking his degree. Latest catalogs of representative colleges and universities are available for examination in the Graduate School business office. Catalogs of the Land-Grant Colleges are available for examination in the Department of Agriculture Library.

Master's Degrees. Degree-granting institutions will generally permit six semester hours of graduate credit to be transferred from another institution, including the Graduate School of the Department of Agriculture. Some institutions require that all study for the Master's degree be taken in residence. In other institutions more than six hours may be transferred from the Graduate School of the Department of Agriculture when the additional work is taken with the prior approval of the head of the student's major department and the graduate dean.

Doctor's Degrees. Almost universal academic practice permits the graduate student to complete two of the three years' work necessary for the doctorate outside the degree-granting institution, or a year beyond the Master's degree. Most students will find it advantageous to take the last year in residence.

Undergraduate Deficiencies. Graduate schools generally permit deficiencies to be made up out of residence. Those students

who have deficiencies pointed out by their graduate deans may make them up in the undergraduate courses offered by the Graduate School of the Department of Agriculture.

Language Requirements. It is possible for graduate students to complete their preliminary language requirements and introductory course requirements subject to optional examination by the degree-granting institution.

CERTIFICATION

Inclusion in Personnel Record for Department of Agriculture Employees. To aid in effecting its promotion-from-within policy, the Department has provided (USDA Administrative Regulations, Title 8, Chapter 42, paragraphs 1548-1551, dated 10-13-48) that a record of Graduate School credits earned by its employees will be placed in official personnel files of the agency. Unless specifically requested by the employee that such action not be taken, the Graduate School will forward, upon completion of the courses or at the end of the year, a copy of the student's record, without cost to the employee, to the personnel officer of the administration, bureau or office in which the student is employed.

Certification on Request. Upon a student's written request, an informational record of his work at the Graduate School will be sent to him or to an organization designated by him. An official transcript of academic credit to be transferred to a college or university will be made only when the student has filed with the Graduate School a transcript of his previous academic work showing that he has met all requirements for admission to the level of the courses for which he registered.

CERTIFIED STATEMENTS OF ACCOMPLISHMENT

Certified Statements of Accomplishment are offered in the fields of Accounting, Administrative Procedures, Agricultural Economics, Public Administration, and Statistics upon the student's completion of specified programs of study. Each student interested in earning a Certified Statement of Accomplishment in any of these fields should receive approval, from the Registrar, of his proposed program of study. For complete details see the outlined program in the Department concerned.

These statements are offered to encourage the student to complete a well-rounded approach to his chosen field of study or work, so that he may more competently discharge his present and prospective responsibilities as a public servant. Courses completed and the quality of accomplishment are recorded on the back of the statement which may be used as a personal record of achievement or a public record of qualification.

Regulations and Procedures

ADMISSION

Admission to resident courses in the Graduate School is open to all qualified employees in the Federal service, and to such other qualified individuals as facilities will permit.

VETERANS

Graduate School courses are available to veterans of World War II under the provisions of Public Laws 346 and 16. Registration for part-time study is charged against educational benefits only in the proportion that the number of semester hours bears to a full normal load.

Veterans intending to enroll in the Graduate School should apply as soon as possible to the Regional Office of the Veterans Administration for an official certificate of eligibility and entitlement showing the amount of educational benefits to which they are entitled. This certificate of entitlement will be accepted by the Graduate School in lieu of tuition fees and charges for books and supplies.

In cases where an official certificate has not been received prior to the time of registration, the veteran will be required by the Graduate School to pay at least one half of his tuition plus whatever fees may be applicable, with the understanding that course fees will be refunded retroactive to the effective date on the letter of entitlement.

ENTRANCE REQUIREMENTS

Since the Graduate School does not offer degree programs, entrance requirements differ with the level of the course for which the student is registering.

COURSE PREREQUISITES

Undergraduate courses, in general, are open to persons who are graduates of a standard high school or equivalent or who qualify for the course because of satisfactory work experience. For admission to more advanced courses college work in the same or related field is specified or understood. For other courses definite prerequisites may be stated. Year courses require the completion of the work of the first semester or its equivalent.

COURSE LOAD

Students employed full time may not carry more than two courses. Should they wish to register for an additional course, permission must be secured from the Registrar.

CLASSIFICATION OF COURSES

1. The courses of study offered are classified according to aim, amount of advancement, or subject matter.
2. According to amount of advancement, some courses are for undergraduates only, others for undergraduates of sufficient maturity or graduates, and still others for graduates alone.
3. Courses are numbered according to degree of advancement of the course: below 100, non-credit; 100-399, undergraduate; 400-699, graduate and advanced undergraduate (senior); above 699, graduate.
4. The value of the course in semester hours is given below the course title.

REGISTRATION REGULATIONS

Registration. Registration is during the periods scheduled in the School calendar, see inside front cover. Students will register in the School office, Room 1031 South Building, or in such other rooms as will be designated. Mail registration forms will be supplied on request. After September 30 in the fall semester, February 17 in the spring, and June 12 in the summer, students may enroll for credit only with the approval of the instructor and the Registrar. Registration is not completed until the required fees have been paid. When the limitation set for each course is reached, registration for that course is closed. The Graduate School reserves the right to cancel any course if registration does not warrant continuance.

Opening Date. The twenty-ninth year of the Graduate School opens Monday, September 19, 1949. All classes begin during the week starting on that date. The fall and spring semesters run fifteen weeks each and the summer session ten weeks. Spring semester classes begin on February 6 and the summer session on June 5.

ATTENDANCE AT CLASSES

Students are expected to attend all class sessions and not to absent themselves without adequate reason.

Absences do not relieve the student from responsibility for work required while he was absent, and the burden of proof that the work was done rests with the student. In courses in which the work cannot be satisfactorily tested by written examination, the instructor shall be the judge of the relation of the student's attendance or non-attendance to his grade. All auditors, and other students carrying

undergraduate courses who do not make up all required work, who are absent more than 25 per cent of the class periods will receive a mark of "W," withdrawn.

WITHDRAWAL

Withdrawals are permitted only under justifiable circumstances. A student who is obliged to withdraw from the Graduate School or from a course must immediately notify the Registrar, in writing.

Withdrawal from a course or from the Graduate School, without academic or financial penalty, requires the permission of the Registrar. Permission to withdraw will not be granted to a student who does not have a clear financial record. Reporting the dropping of a course to an instructor does not effect its discontinuance nor constitute an official withdrawal.

CREDIT AND GRADES

Academic Credit. Persons registering for academic credit must satisfy all prerequisites for admission to the course as generally stated or specified in the course description.

Audit. An auditor must meet the same prerequisites as a credit student. He receives full privileges of class participation if he chooses to exercise them. An auditor does not receive a grade; he receives only a mark of AUD.

Grades. At the close of the semester students registering for credit receive written notice by mail of grades received. The following letter grades are used:

A	Excellent
B	Good
C	Fair
D	Passable
F	Failure
Aud	Auditor
Inc	Incomplete
W	Withdrawn

TRANSFER OF CREDIT

An official transcript of academic credit earned at the Graduate School will be made for each student requesting it if he has filed with the Graduate School a transcript of his previous academic work. This must show that the student has met all requirements for admission to the level of the courses for which he registered and for which he wishes official certification.

FEES

Course Fees. In general, fees are computed at \$8.00 per semester hour credit for strictly undergraduate courses and \$9.00 per semester hour for graduate and advanced undergraduate courses.

Late Fees. There is a \$2 late registration fee and a \$1 late transfer fee as shown in the School Calendar.

Reinstatement Fee. Students who fail to meet payments when due are charged a reinstatement fee of \$2.00 per course in addition to all accrued fees.

Laboratory Fee. Laboratory or materials fees are listed in the Schedule of Classes for each semester, in connection with the courses for which they are charged.

Service Fee. A fee of \$1 per course is charged each student using the deferred payment plan.

Transcript Fee. There is a 50¢ fee for each copy of a student's record on the regular Graduate School form or on the form of another institution or state board of education.

PAYMENT OF FEES

Fees are due and payable in advance at the time of registration. Registration is not complete and no student is permitted to attend classes until all fees have been paid. Enrollment constitutes an agreement on the part of the student to complete the course unless he meets the withdrawal requirements.

In exceptional cases, subject to the approval of the Registrar, the student may sign a contract permitting payment of one-half of the fees at the time of registration plus a \$1.00 service charge and the balance on or before November 4 in the fall semester, March 24 in the spring semester and July 7 in the summer session.

A student who fails to meet payments when due will be suspended and may not attend classes until he has been reinstated and has paid all accrued fees as well as a reinstatement fee of \$2.00.

All fees are payable at the Graduate School business office, Room 1031, South Building, United States Department of Agriculture.

WITHDRAWAL WITH REFUND OF FEES

Application for withdrawal or change in class schedule must be made in person at the Graduate School business office. Notification to an instructor is not acceptable notice. Since commitments for instruction and other arrangements are necessarily made in the beginning of the semester, no refund of fees can be made except as herein indicated.

Withdrawals with refunds are permissible under justifiable circumstances upon written request of the student made within the

refund period for each term on or before: September 30 in the fall semester, February 17 in the spring semester and June 12 in the summer session. When a student is granted permission to withdraw within this refund period, his fee minus a \$3.00 registration charge for each course will be refunded.

When a student is permanently transferred by official action out of the Washington area and he has been given permission to withdraw, his tuition fee, minus a \$3.00 registration charge for each course, will be refunded in the amount proportionate to the unexpired portion of the semester. No refund will be made of laboratory and other incidental fees. Written evidence of such transfer must be presented. Permission to withdraw with refund will not be granted in cases arising out of the student's voluntary action.

All adjustments are made as of the date on which application for withdrawal with refund is received. In no case will tuition be reduced or refunded because of non-attendance in classes.

Authorization to withdraw and certification for work done will not be given to a student who does not have a clear financial record. Students withdrawing under request from the Graduate School are not entitled to any return of fees.

TEXTBOOKS

The Graduate School maintains a bookstore, for the convenience of the students, in Room 1041, South Agriculture Building. Students are urged to purchase their books at the time of registration or soon thereafter. The book store is open afternoons and evenings during registration and the first week of school; and from 4:30 to 5:30 p.m., Monday through Friday, during the remainder of the semester.

ROOM ASSIGNMENTS

Classroom assignments, insofar as practicable, will be given the student at the time of registration. Classroom assignments, not available at the time of registration, will be posted the week that classes begin on bulletin boards outside of Room 1031, and in the north entrances of the fourth and seventh wings, of the South Building, United States Department of Agriculture.

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The Graduate School reserves the right to cancel any course if registration does not warrant continuance; to discontinue, postpone or combine classes; to change instructors; to make any changes deemed advisable in registration and in fees; and to require the withdrawal of any student at any time for such reasons as the School deems sufficient.

Department of Biological Sciences

DEPARTMENTAL COMMITTEE

ALBERT H. MOSEMAN (Chairman)

RONALD BAMFORD

F. C. BISHOPP

EDWARD H. GRAHAM (Vice-chairman)

WILLARD H. WRIGHT

NEIL HOSLEY

E. L. LECLERG

O. E. REED

—O—

Familiarity with basic biological subjects is considered an important adjunct to those engaged in economic and social, as well as the physical, aspects of government. Keeping abreast of the latest developments in the actively growing field of biology is necessary for many persons professionally employed in agriculture and related fields. The Department of Biological Sciences offers the courses listed below with the conviction that they will aid Federal employees in obtaining knowledge either of the fundamentals of or the most recent developments in selected biological subjects.

Elementary courses are intended as an introduction to subjects in which members of the Department of Agriculture or other Federal agencies require general knowledge. Courses in recent advances are usually of a seminar nature, and provide for a maximum of discussion of new developments by those working in such fields or related activities. Outstanding specialists from Federal and other research institutions participate.

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Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate (senior); above 699, graduate. Bracketed numbers, not given this year.

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110. General College Biology

Year, 4 credits each semester (alternate years)

HENRY W. OLSON

An introductory course, designed to acquaint the student with the relationships of animals to each other and to their environment. A study is made of life processes and the structural plans of several representative forms of each phyla, of the morphology, physiology, and development of the cell, of the principles of inheritance and evolutionary relationships. The course will consist of lectures, demonstrations and individual laboratory work.

The second semester is designed to acquaint the student with major principles of botany. The lectures, demonstrations, and individual laboratory work will include a brief survey of the plant kingdom, the study of the structure and life processes of the flowering plants, and the elements of plant physiology.

With the use of the manual, the class will study the general identification of seed plants, in order to acquire familiarity with their distinguishing features and classification. The class meets in the Biology Laboratory of Wilson Teachers College, 11th and Harvard Sts., N. W.

[250.] **Bacteriology** (1950-51 and alternate years)

HENRY W. OLSON

[320.] **Human Physiology** (1950-51 and alternate years)

HENRY W. OLSON

209. Systematic Botany—Principles of Classification

Fall, 2 credits

SIDNEY F. BLAKE

An introductory course intended to give those with no previous experience in systematic botany an acquaintance with the subject sufficient to enable them to use the ordinary manuals to advantage. Begins with a study of the morphology of the flower, fruit, leaf, stem, and other parts used in classification and of the technical terms used in describing them. A survey of the principal families of flowering plants with discussion of their distinctive characters and mention of the economically important species, illustrated by herbarium specimens; and a summary of the principal systems of plant classification. *Prerequisite:* College biology or consent of instructor.

210. Systematic Botany—Identification Techniques

Spring, 2 credits

SIDNEY F. BLAKE

Devoted to the identification of wild plants of this region by the use of Gray's Manual of Botany, giving the student familiarity with the descriptive terms used and a first-hand acquaintance with the principal plant families. One or more short field trips will be made. *Prerequisite:* College biology, systematic botany, or consent of instructor.

213. Identification of Local Plants

Summer, 2 credits

AUGUSTINE V. P. SMITH

An elementary course, with no prerequisites, dealing with the process of determining the names of the plants, both wild and cultivated, trees, shrubs, herbs and wild flowers, of the vicinity of Washington, D. C. The work will include discussion of the books and keys to the plants, the language they are written in, and how to use them. Most of the work will be with actual plants, largely those brought in by the students or gathered on class field trips. Instruction and demonstration will be given in the methods of pressing, drying, and mounting plant specimens.

World Agriculture

(See p. 88)

214. Birds of the Washington Area

Summer, 2 credits

CHANDLER S. ROBBINS

Introduction to birds of the District of Columbia region, stressing field identification, but touching on classification, distribution, migration, nesting, ecology and research methods. Museum collections of birds will be inspected and recordings of bird songs will be available in addition to the field trips.

[300.] **Fundamentals of Entomology** (1950-51 and alternate years)

REECE I. SAILER

512. Medical and Veterinary Entomology

Year, 2 credits each semester (alternate years)

F. C. BISHOPP

A timely general course in medical entomology with emphasis on the practical aspects of this important field. The biology, habits, and relation to disease of insects, spiders, mites, and ticks, are discussed. How these arthropods affect man and animals as intermediate hosts, or carriers of disease-producing organisms, is given attention and special consideration is given methods of control. The adaptation of known control procedures to present-day problems is considered. Features of the course include lectures by outstanding specialists in this general field and round-table discussions of practical problems. *Prerequisite:* Basic training in entomology or consent of instructor.

[518.] New Developments in Insecticides (1950-51 and alternate years)

F. C. BISHOPP and SPECIALISTS

519. New Developments in Fungicides

Fall, 2 credits

JOHN C. DUNEGAN, M. C. GOLDSWORTHY and SPECIALISTS

A discussion by outstanding specialists of the place of fungicides in human economy. The chemistry, manufacture, pharmacology, compounding, methods of application and usefulness of fungicides in protecting man, clothing, buildings, houses, barns, gardens, fruit, field crops, forests, and stored products from fungus attack. Discussion of practical problems in the application of fungicides. *Prerequisite:* Basic courses in biology and chemistry or consent of instructors.

[603.] Advances in Plant Breeding and Genetics (1951-52 and every third year)

F. J. STEVENSON and SPECIALISTS

[608.] Advances in Human and Animal Nutrition (1950-51 and alternate years)

PAUL E. HOWE

[609.] Recent Developments in Plant Physiology and Plant Nutrition (1950-51 and alternate years)

FRANK P. CULLINAN and SPECIALISTS

[620.] Advances in Weed Control Practices (1950-51 and alternate years)

L. W. KEPHART, LEWIS S. EVANS and SPECIALISTS

700. Progress in the Field of Antibiotics

Spring, 2 credits

GEORGE W. IRVING, JR., and SPECIALISTS

Present status of the chemistry, production and medicinal value of penicillin and streptomycin will be reviewed. Other lecture topics will include discussion of new antibiotics from molds, bacteria, yeasts, and green plants. *Prerequisite:* Work in antibiotics or in related fields.

[701.] Virus Diseases of Man and Animals (1950-51 and alternate years)

KARL HABEL and SPECIALISTS

Department of Languages and Literature

DEPARTMENTAL COMMITTEE

LESTER A. SCHLUP (Chairman)

GEORGE E. BEAUCHAMP
J. P. BLICKENSERFER
JAMES O. HOWARD
ERWIN JAFFE

J. KENDALL MCCLARREN
RALPH R. SHAW (Vice-chairman)
HENRY LEE SMITH
R. LYLE WEBSTER

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IMPORTANCE OF ENGLISH, WRITING AND SPEECH

Among students preparing for technical careers and among busy people employed on the basis of their technical competence, there is an inevitable tendency to concentrate on subject-matter specialties, to the great neglect—if not exclusion—of the auxiliary subjects that can effectively implement such specialties. It is common knowledge in the Government service that nothing so much retards the progress of many young technicians, scientists, and other professional personnel as their inability to incorporate the results of their thinking and of their research in effective, concise, lucid English, written or oral. Technical knowledge is of no value unless it can be communicated to others. There are indeed few persons who cannot greatly benefit from the further sharpening of their tools of communication.

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Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate (senior); above 699, graduate. Bracketed numbers, not given this year.

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ENGLISH AND LITERATURE

222^a. English Composition

Fall, 3 credits. Repeated in Spring and Summer

FRANCES H. MILLER

Equivalent of freshman English. An introductory course in writing and English usage, designed especially for those who need a course preparatory to more advanced English studies. Special attention given to the fundamental principles and mechanics of good writing—grammar, punctuation, spelling, diction, etc. Exercises in writing short and long themes and in studying, analyzing, and evaluating selected English prose texts.

222^b. English Composition

Spring, 3 credits

KATHRYN PAINTER WARD

Continuation of course 222^a above.

223. Descriptive English Grammar

Fall, 2 credits. Repeated in Spring and Summer KATHRYN PAINTER WARD

A course in the study of grammatical principles, stressing sentence structure and correct English form. Lectures on the history and development of inflectional and derivational forms. Exercises in diagramming and in analyzing examples of good and bad English.

118. Practical English Usage

Fall, 2 credits. Repeated in Spring and Summer VERNE L. SAMSON
CHARLOTTE L. WHITE

This course enables students through practice to master the fundamentals of correct English. Troublesome problems of English usage, sentence structure, choice of words, style, and grammar, are studied as aids to clear and forceful writing of letters, memoranda, and reports.

119. Vocabulary Building

Fall, 2 credits. Repeated in Spring and Summer CHARLES D. MURPHY

Designed to help writers and speakers express ideas clearly and attractively. It embraces word study and selection, diacritical markings, synonyms and antonyms, prefixes and suffixes, usage exercises, and other means of developing a broad and useful command of words.

51. English for Foreign Students

Fall, non-credit. Repeated in Spring MARION H. YOUNG

A course designed to meet the needs of students with a foreign-language background. Includes practice in correct and fluent expression in writing and speaking with emphasis on diction, vocabulary, and study of idiom and difficult grammatical expressions. *Prerequisite:* Ability to read and speak English.

330. Great Books

Year, 2 credits each semester * M. CLARE RUPPERT

Group discussion, under leadership, of important works in poetry, history, philosophy and criticism. The leader will try to help with the reading and understanding, but the books themselves will be the teachers. The intention of the course is to give insight into perennial, and therefore contemporary, problems, not historical and literary information. The only qualifications required are an interest in ideas and belief in free discussion. With few exceptions the books will be read in their entirety. One, two, or three meetings will be given to a book depending upon its length. Discussion will center around the following authors:

Fall Semester: Homer, Sophocles, Aeschylus, Thucydides, Herodotus, Plato, Aristotle, Lucretius, Tacitus, Marcus Aurelius, Augustine, Thomas Aquinas.

Spring Semester: Dante, Machiavelli, Shakespeare, Cervantes, Bacon, Hobbes, Rousseau, Swift, Goethe, Kant, Marx, Henry Adams.

310. Survey of Great Plays

Year, 2 credits each semester * KATHRYN PAINTER WARD

The first semester will be concerned with the development of English drama from its beginning through the work of Shakespeare to 1642, the date of the closing of the theaters under the Commonwealth. The second semester will include a study of significant plays in English drama from 1660 to 1900 supplemented by readings from contemporary American dramatists such as: Eugene O'Neill, Maxwell Anderson, and Thornton Wilder. Lecture and class discussion, written dramatic criticisms.

* Students may attend both semesters or either semester.

SPEECH

COMMITTEE ON SPEECH

GEORGE E. BEAUCHAMP (Chairman)

WALTER B. EMERY

E. J. ROWELL

RUTH WAKEHAM

228. Fundamentals of Speech

Fall, 2 credits. Repeated in Summer

RUTH WAKEHAM

Through the preparation and delivery of short original speeches the student gains poise, assurance, and the ability to express himself clearly and accurately. Strict adherence to time limit quickens mental processes and develops discrimination in the selection of speech material. Voice, articulation, and pronunciation drills. Posture, movement, and gesture. Learn to speak by speaking at each class meeting. Constructive criticism.

229. Public Speaking

Spring, 2 credits

GEORGE E. BEAUCHAMP

Theory and practice of effective speaking through: (1) audience analysis, (2) organization of speech material to achieve a specific response, (3) delivering speeches for special occasions (radio, good will, welcome, presentation, acceptance, etc.), (4) planning an interesting and dramatic meeting, (5) officiating at banquets. Each student speaks at every class meeting. It is assumed that the student has some knowledge or experience in speech making.

400. Effective Speaking

Fall, 2 credits

GEORGE E. BEAUCHAMP

A course designed for persons who have previously had a beginning course or some practical experience in public speaking. Special attention is given to types of speeches, organization and writing of speeches, and effective delivery.

567. Principles of Persuasion

Spring, 2 credits

ROBERT T. OLIVER and GEORGE E. BEAUCHAMP

Human motivation as exemplified in basic principles of persuasive thinking is analyzed and practiced in speeches and letters; the influence of emotion, rationalization, stereotypes, prejudice, and the will-to-believe are stressed.

232. Voice and Remedial Speech

Fall, 2 credits. Repeated in Summer

WALTER B. EMERY

Study and intensive drills in voice production, flexibility, range, articulation, and enunciation. Training and practice are designed to improve vocal conditions for all speech purposes and to remedy minor speech difficulties. In order that students may receive more individual attention, registration is limited to twenty.

This course is intended to improve the normal voice and minor speech difficulties. Prospective students with major speech difficulties are urged to enroll in the Speech Clinic.

234. Correction of Speech Dialect

Spring, 2 credits

WALTER B. EMERY

Designed for persons having local or foreign dialect wishing to acquire standard American pronunciation and speech; intensive phonetic studies and drills to help the student hear properly and produce correctly American speech sounds and to avoid deviations therefrom; special reading and speaking exercises to improve diction and conversational ability; training is designed to serve individual needs.

50. Speech Clinic

Fall, non-credit. Repeated in Summer

WALTER B. EMERY

A speech clinic has been organized as a service to Graduate School students. The clinic is designed to help correct serious abnormal speech disorders. Private consultation and practice with instructor 20 minutes per week for 15 weeks. Schedule of evening or Saturday appointments to be arranged with the instructor. Limited to 8 students.

305. Radio—Writing and Speaking

Spring, 2 credits

E. J. ROWELL

This course is designed for those who are interested in broadcasting the human voice, pointing up the desirable qualities which make for radio broadcasting. A condensed study of our two languages, that for the ear and that for the eye, will be made. Preparation and presentation of talks, interviews and conversations, including exercises in voice control and microphone techniques.

PRESENTATION METHODS

320. Introduction to Public Information Media

Fall, 2 credits

RICHARD FITZPATRICK

Presenting to the public current, accurate, objective information is essential in democratic government. The course will include a review of the interrelation of public opinion, public interest and public information; the importance, potentialities and issues of mass communication; evaluation of the use and effectiveness of newspapers, magazines, books, radio, facsimile, television, motion pictures, and advertising as channels of public information; limitations on the effectiveness of mass media; propaganda and censorship; and mass communication in the international field. Opportunities in public information as a profession will be discussed. *Prerequisite:* Background in any social science or practical experience in editorial or informational work.

Government Public Relations

(See p. 69)

240. Audio-Visual Aids in Information and Education

Fall, 2 credits

SEERLEY REID and R. L. WEBSTER

A survey of the many ways audio-visual aids can be used in training, employee relations, and information and education programs. Covers not only newer materials such as motion pictures, filmstrips, and recordings, but also modern uses of photographs, charts, graphs, maps, and the like—even the art of using a blackboard. Gives practical suggestions on the most effective use of these aids for different purposes—developing physical skills, imparting information, changing attitudes, and otherwise influencing human behavior. Lectures and demonstrations with guest speakers presenting material on special topics. Each student will have the opportunity to choose his own problem for intensive study.

025. Seminar—Workshop in Television Programing

Year, non-credit

KENNETH M. GAPEN, MAYNARD A. SPEECE
and THOMAS M. NOONE, JR.

Discussion, demonstration and analysis of the integral components of television programing, on a practical problem basis. Emphasis on visuals, packaged programs, television facilities, financing program costs, program techniques, and program evaluation. The seminar will concentrate chiefly on the expanding role of television in disseminating agricultural and consumer information. It will serve also as a means of reporting and interpreting results of the RMA

television research project. Basic problems, methods, techniques, etc., included in the course will have application to the information work of other branches of Government.

Under the leadership of the USDA Office of Information's Radio and Television Service, the seminar will meet fortnightly, chiefly during the day but with some evening sessions. Designed for and open to all information specialists, scientific and administrative personnel and others in the Department of Agriculture whose official duties have a relationship to television programming. Because the problem approach is employed, regular attendance will not be required. Open to persons in similar occupations outside USDA. No fee is charged; registration is required, however. The individual must secure approval of his agency and of the Office of Information.

225. Principles of Editing and Their Application

Fall, 3 credits

ROY E. MILLER and SPECIALISTS

Limited to 40 students.

Intended primarily for those seeking information on editorial techniques involved in handling manuscripts after they leave the author's hands and until they are issued in printed form. Discussion of the fundamental principles of editing, including the organization or rearrangement of material for effective presentation; rhetorical style in relation to subject matter; word forms, sentence structure and effective use of English; the Style Manual of the Government Printing Office; considerations governing titles, tables of contents, headings, footnotes, illustrations, literature citations and bibliographies, and statistical checking; the principles of table formation and arrangement; the relation of type to subject matter and the techniques of printing; and the fundamentals of indexing and proofreading. Opportunity is afforded to apply these principles in practical work in editing, which is then discussed in class. A trip to the Government Printing Office is arranged to note and study operations there.

360. Advanced Practice in Editing

Spring, 2 credits

CHARLOTTE L. WHITE

Advanced instruction in literary and statistical editing and the preparation of tables. The class will work on editorial material provided by the instructor or submitted by the students. *Prerequisite:* Principles of Editing and Their Application or consent of the instructor.

224. Creative Writing—Fiction

Fall, 2 credits. Repeated in Summer

DELIGHT WILLIAMSON HOLT

Instruction will be limited to the study of the technique of fiction writing. Attention will be given both to longer and shorter forms, but assignments will be, for the most part, in the field of the short story. Work of the course will be divided between lectures on technique and discussion of manuscripts submitted. Problems of marketing and selling will be considered. Manuscripts must be typewritten. *Prerequisite:* English Composition or equivalent, or permission of instructor.

230. Creative Writing—Essay, Poetry, Drama

Spring, 2 credits

DELIGHT WILLIAMSON HOLT

Instruction will be limited to the study of the technique of the essay, poetry, and drama. Expressed interests of the class will determine the emphasis given to each of these creative fields. Work of the course will be divided between lectures on technique and discussion of manuscripts submitted. Manuscripts must be typewritten. *Prerequisite:* English Composition or its equivalent, or permission of instructor.

410. Creative Writing Workshop

Spring, 2 credits

DELIGHT WILLIAMSON HOLT

This course will consist entirely of open forum discussion of the work of class members. Students will work on projects of their own choosing in any phase of creative writing in which they are interested. *Prerequisite:* Creative Writing or equivalent or permission of the instructor.

226. Introduction to Official Writing

Fall, 2 credits

J. KENDALL McCLARREN and MARGUERITE GILSTRAP

This course covers the principles of clear statement that must be applied to all forms of writing. Emphasis is given to the special requirements of official writing within the boundaries of economic and scientific research, government organization, and official policy. Frequently these limitations lead to a style that is wordy and lifeless. The course, which presupposes some writing experience, considers ways of making official writing clear, vigorous, and readable in spite of the necessary rules and restrictions. One major writing project is required.

250. Interpretive Writing on Official Action

Spring, 2 credits

J. KENDALL McCLARREN and MARGUERITE GILSTRAP

This course presents informally the elements of explaining official activities through newspaper releases, magazine articles, printed reports, radio scripts, and other public media. The workshop method is followed so far as practical with practice in the preparation of background and interpretive material on government research, programs, and policies. *Prerequisite:* Introduction to Official Writing or equivalent.

[200.] Readable Writing (1950-51 and alternate years)

AMY G. COWING and HARRY MILEHAM

120. Indexing

Fall, 1 credit

MABEL H. DOYLE

This course is intended primarily for those interested in making indexes for periodicals, bulletins, reports, and books. Emphasis will be placed on general procedures and matters of policy as well as on basic principles and techniques. Specific types of indexing adapted to various subjects and popular style, contrasted with technical and scientific styles, will be studied. Examples of different kinds of indexes will be shown and opportunity given for practical work in the preparation of indexes, including the making of cross references, alphabetizing, and editorial preparation of index cards and manuscripts for the printer.

237. Government Printing Procedure

Spring, 2 credits

LOUIS H. ANDERSON

Intended for those who plan, prepare, or procure printing, duplicating, and distribution of books, pamphlets, folders, posters, charts, forms and other printed or duplicated matter. Subjects covered include: analysis of manuscript copy and its purpose to determine format and method of production; organization of copy for effectiveness; copy fitting and measuring; ways to aid the reader to grasp the message of the printed word; legibility and readability; type faces and typography; illustrations; printing and duplicating processes and criteria for their use; paper; binding methods; preparation of copy for duplicator and printer; handling of proofs; specifications and cost factors; and channels and methods of distribution of Government publications. The knowledge of methods and procedures to be acquired from this course is intended to give the student competence and confidence in dealing with author and editor, and printing, duplicating and distribution technicians.

43. Personal Development

Fall, non-credit. Repeated in Spring

HESTER H. GALVIN and HESTER B. PROVENSEN

Discovery and development of potentialities of each student. Poise, confidence, appearance, make-up, dress and color sense, art of conversation, and cultivation of wider range of interest and curiosity. Actual social situations created and discussed. Conferences, guest speakers.

70. Introduction to Library Service

Fall, non-credit

MARY C. DEVEREAUX

Designed to provide a background of information and training for the sub-professional assistant by introducing him to the general organization of the library, its resources and services. The course is aimed at providing the student with a clear understanding of the functions of the library; at training him in the efficient use of basic library material and tools, such as the card catalog and general reference books; and at acquainting him with the place of the sub-professional assistant in the general organization of library service.

71. Introduction to Library Techniques

Spring, non-credit

MARY C. DEVEREAUX

Designed to instruct the sub-professional library assistant in the technical operations in general usage at this operative level. Includes such techniques as: circulation methods and procedures, book purchasing routine and records, simple processing and preparation of materials, filing, inter-library loan service, etc.

550. Post-War Library Trends: A Review and Appraisal

Fall, 1 credit

RALPH R. SHAW and SPECIALISTS

A series of lectures and discussions designed for professional librarians who seek to understand important library developments since the end of the war. Among the topics to be considered are Library Cooperation, The Career of the Librarian, Subject Specialization in Book Services, Relation of the Federal Government to Local Facilities, and Library Architecture. Lecturers and discussion leaders will be members of the Faculty of the School of Library Service, Columbia University, and selected librarians. Detailed information about the series, including a complete list of topics and speakers, will be available at time of registration. *Prerequisite:* Degree in Library Science or equivalent professional experience.

FOREIGN LANGUAGES

Events of World War II and the unprecedented expansion of all kinds of international activities have greatly increased interest in the study of foreign languages. Research workers, those employed in all aspects of international relations, and those scheduled for foreign assignments are in need of foreign-language instruction. With the expansion of international land, water and air transportation many persons find it desirable to improve their facility of speech in some foreign language before visiting our world neighbors.

The Graduate School provides opportunities for instruction in a wide range of foreign languages. The person who is seeking the maximum practical value from a foreign language must learn not

only to translate it but to think in it well enough for translation to be unnecessary. It is the aim of those responsible for these courses to conduct them so as to develop in their students a ready and intelligent use of the language.

INTENSIVE LANGUAGE INSTRUCTION

The Department of State is authorized to provide language training, through the Foreign Service Institute, for Federal employees who are certified by their agencies as requiring language training to perform necessary duties in connection with definite foreign assignments. Upon written certification by the agency, official arrangements may be made to place such persons in one of the regular intensive language classes offered by the Foreign Service Institute, depending upon the availability of facilities. Such training will be given on official time at no cost to the student. Department of Agriculture employees may secure information about this program from the Registrar. Persons from other Departments may secure information from the Registrar or directly from Dr. Henry Lee Smith, Jr., Foreign Service Institute, Department of State, Ext. 3260.

DIRECTED LANGUAGE STUDY

In some languages and in specialized scientific fields, enrollment is insufficient to justify offering instruction on a regular basis. If fifteen or more students inform the Graduate School office of their wish to take advanced work in a language, a class may be organized in which students will proceed with their study on an individual basis under the instruction of a teacher who will guide their study.

ARABIC, CHINESE, CZECH, DUTCH, GREEK, HINDU, JAPANESE, MALAY, POLISH

Groups of students desiring instruction in any one of these languages are requested to notify the Graduate School of their interest. If a sufficient number are interested, an instructor will be secured and all necessary arrangements made to offer the course.

Unless otherwise specified, all foreign language courses are organized as follows:

Elementary year—foundation work in grammar, vocabulary, reading, and translation, with some conversation.

Intermediate year—grammar review, more difficult reading and translation, use of idioms, writing and discussion in the language.

Conversation—development of facility in discussion and reading, use of idioms, writing and thinking in the language without translating.

Note: Course numbers followed by (a) are first-half of that course, or by (b) are second-half.

FRENCH

253^a. Elementary French

Fall, 3 credits. Repeated in Spring

JACK C. ARNOULD
HENRI DE MARNE**253^b. Elementary French**

Spring, 3 credits. Repeated in Summer

JACK C. ARNOULD
HENRI DE MARNE**254^a. Intermediate French**

Fall, 3 credits

MARGUERITE PORTE

254^b. Intermediate French

Spring, 3 credits

MARGUERITE PORTE

255^a. French Conversation

Fall, 2 credits

HENRI DE MARNE

255^b. French Conversation

Spring, 2 credits

HENRI DE MARNE

48. Elementary Scientific French

Spring, non-credit

LUC SECRETON

GERMAN

259^a. Elementary German

Fall, 3 credits. Repeated in Spring and Summer

MAX LEDERER
JOSEPH PONTI**259^b. Elementary German**

Fall, 3 credits. Repeated in Spring and Summer

MAX LEDERER
JOSEPH PONTI**260^a. Intermediate German**

Fall, 3 credits

MARIANNE LEDERER

260^b. Intermediate German

Spring, 3 credits

MARIANNE LEDERER

261^a. German Conversation

Fall, 2 credits

MAGNA E. BAUER

261^b. German Conversation

Spring, 2 credits

MAGNA E. BAUER

262. Advanced German

Year, 3 credits each semester

JOSEPH PONTI

Extensive and intensive reading of major German works of the 19th century and the beginning of the 20th century with particular stress on vocabulary building and the acquisition of facility in sight-reading. *Prerequisite:* Two years of college German or the equivalent.

60. Elementary Scientific German

Spring, non-credit

LUC SECRETON

ITALIAN

270^a. Elementary Italian

Fall, 3 credits

ALARIC EVANGELIST

270^b. Elementary Italian

Spring, 3 credits

ALARIC EVANGELIST

[271.] Intermediate Italian

RUSSIAN

295^a. Elementary Russian

Fall, 3 credits. Repeated in Spring and Summer

GEORGE M. KORENEV ROCKWELL
ERIC T. SCHULER
EUGENIA TARAKUS

295^b. Elementary Russian

Fall, 3 credits. Repeated in Spring and Summer

GEORGE M. KORENEV ROCKWELL
ERIC T. SCHULER
EUGENIA TARAKUS

296^a. Intermediate Russian

Fall, 3 credits

GEORGE M. SAHAROV

296^b. Intermediate Russian

Spring, 3 credits

GEORGE M. SAHAROV

299^a. Advanced Russian

Fall, 3 credits

GEORGE M. SAHAROV

299^b. Advanced Russian

Spring, 3 credits

GEORGE M. SAHAROV

[297.] Russian Conversation

GEORGE M. SAHAROV

46. Everyday Russian

Summer, non-credit

GEORGE M. SAHAROV

Accuracy and facility in the use of oral Russian will be attempted through use of dictation, conversation, and other devices. The work will be adapted to those entering the course. The course is designed especially for those who wish to acquire fluency in the spoken language of today. *Prerequisite:* One year of Russian.

49. Elementary Scientific Russian

Fall, non-credit

ANTOINETTE PINGELL

55. Intermediate Scientific Russian

Fall, non-credit. Repeated in Spring

ANTOINETTE PINGELL

SPANISH

300^a. Elementary Spanish

Fall, 3 credits. Repeated in Spring and Summer

MARINA CON DE IGLESIA
ERWIN JAFFE
EUGENE YSITA**300^b. Elementary Spanish**

Fall, 3 credits. Repeated in Spring and Summer

MARINA CON DE IGLESIA
ERWIN JAFFE
EUGENE YSITA**301^a. Intermediate Spanish**

Fall, 3 credits

JOSE GARCIA-TUNON

301^b. Intermediate Spanish

Spring, 3 credits

JOSE GARCIA-TUNON

302. Spanish Composition and Conversation

Year, 2 credits each semester

G. MEDRANO DE SUPERVIA

Thorough training in the structure of the language, through reading and discussion of Spanish newspapers, magazines and novels of today. Writing of compositions, commercial and familiar letters; helping student acquire ability to speak and understand everyday and colloquial Spanish. *Prerequisite:* Elementary and Intermediate Spanish or equivalent.

574. Advanced Spanish Conversation and Literature

Year, 2 credits each semester

RAFAEL SUPERVIA

Especially adapted for those having a fair knowledge of the Spanish language, who want to improve it by the readings of and comments on the masters of Spanish literature. *Prerequisite:* Ability to read, understand, and express oneself clearly in Spanish.

47. Everyday Spanish

Summer, non-credit

RAFAEL SUPERVIA

Accuracy and facility in the use of oral Spanish will be attempted through the use of dictation, conversation, and other devices. The work will be adapted to those entering the course. The course is designed especially for those who wish to acquire fluency in the spoken language of today. *Prerequisite:* One year of Spanish.

Department of Mathematics and Statistics

DEPARTMENTAL COMMITTEE

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O. C. STINE

—O—

THE STATISTICIAN AND HIS EDUCATION

Unprecedented dependence is being placed on statisticians by administrative officials in government and private business all over the world. The statistician, through his specialized training, is able to provide current and comprehensive information on many subjects, and to do so with speed and economy.

Competent statisticians are accordingly in great demand, in government, business, and for teaching positions in the universities; the demand will exceed the anticipated supply for many years. The making of a statistician is a long and exacting process—several years of graduate study, plus at least a year and a half of high-grade experience under competent leadership. Educational facilities are strained, not only because of the heavy and increasing demand but also because the educational requirements placed on the statistician today are of an entirely different order of magnitude than they were a few years ago.

The opportunities offered in Washington for statistical education are unsurpassed, particularly with regard to work-experience and theory of modern sample-design. The advanced courses offered by the Graduate School are intended to supplement the statistical studies obtainable in universities. Further supplementation is provided through the internship plan (see page 35), by which practical experience in all aspects of sampling can be gained along with theory.

Statistical training is recognized as a necessary adjunct in such fields as engineering, biology, agricultural science, business, sociology, economics, public opinion, and other branches of the natural and social sciences. Training in these professions is now regarded as incomplete without mathematical and statistical studies, through intermediate grades at least. Courses are offered by the Graduate School to provide this kind of training.

The statistician is particularly equipped by training and experience to assist in the formulation of scientific courses of action in government, manufacturing, and distribution. He must know when data are needed and how much precision is required, and

what the cost should be. He is expected to be expert in the collection, analysis, interpretation, and presentation of quantitative information. He may be called upon to administer a statistical organization. He must therefore be familiar with problems of classification and definition. He is expected to be expert in the design of questionnaires and sampling procedures, and must therefore know field-work and costs. The courses described on the following pages accordingly provide training not only in theoretical principles, but training also in the administrative and research uses of data, as well as in the collection and processing of data and in the development and supervision of the minor skills necessary for carrying out statistical work.

In the design of a survey the statistician is concerned with the reliability and the cost of the figures that are to be obtained. Reliability is affected by many sources of error, which can be classified under two groups: (a) biases that are common to both complete counts and samples; (b) sampling errors. A thorough understanding of both types of error is essential in the work of the statistician. The statistical courses listed on the following pages deal mainly but not entirely with sampling errors. Proficiency in one or another branch of subject-matter such as sociology, economics, agricultural science, engineering, or some other specialized field, is essential for a full appreciation of the first type of error and for that reason collateral studies in one or more fields of science are advised and in fact are insisted upon in work leading to a Certified Statement of Accomplishment in Statistics.

OUTSIDE LECTURERS

The Graduate School has made a practice of bringing one or two outside leaders in statistical thinking to Washington annually. In the past, the following eminent authorities have lectured here: R. A. Fisher, John Wishart, Walter A. Shewhart, J. Neyman, Frank Yates, Harold Hotelling, Harold Jeffreys, P. C. Mahalanobis, L. H. C. Tippett, E. J. G. Pitman, and David J. Finney. Some of these lectures are available in print; see the list of publications on the back cover.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN STATISTICS

A Certified Statement of Accomplishment is offered in each of three fields of statistical study—fields representing areas of statistical preparation and application most useful in the public service. The required program in each field is outlined on page 36. The student who holds a bachelor's degree and who completes the basic courses and earns 24 credits in specialized courses listed in any column, with substitutions only as specifically approved, is eligible to receive a Certified Statement of Accomplishment. It certifies that the stu-

dent has completed a program of study which, in conjunction with collateral training in a subject-matter field of application, prepares him for effective public service in a particular statistical field.

INTERNSHIPS IN SAMPLING

COMMITTEE ON INTERNSHIPS IN SAMPLING

W. EDWARDS DEMING (Chairman)

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S. MCKEE ROSEN

WILLIAM G. COCHRAN

IRVING SIEGEL

MORRIS H. HANSEN

FREDERICK F. STEPHAN

ARYNESS JOY WICKENS

In recognition of the shortage of statisticians with thorough theoretical training and with experience in large-scale statistical projects under competent leadership, and in recognition of the exceptional facilities in Washington for specialized training in this field, the Graduate School has undertaken to present to qualified students the opportunity to pursue their studies under a system of internships. Under this program a limited number of people with the necessary background will have a unique opportunity to combine advanced study with practical experience in sampling. Advanced candidates (Groups a and b below) will undertake a program of approximately a year and a half in duration, consisting in part of theoretical training and in part of work-experience. Candidates in Group c will require a longer period. The program will be planned on an individual basis, depending upon the work, training, and interests of the candidate. These internships carry no stipends. The Graduate School makes and offers no living arrangements. The only fees charged are nominal course fees for those courses in which the intern is registered.

The internships are intended to supplement, not supplant, work offered in universities. The program provides splendid opportunity for graduate students to do research work under leading authorities. The internships are open to three groups:

- a. those who have received their doctorates in mathematical statistics or have completed most of the courses necessary therefor;
- b. those who have received their doctorates or have completed most of the work necessary therefor in some sister profession such as agricultural science, economics, sociology, social psychology, engineering, etc.;
- c. those who cannot meet the above requirements, but who have a bachelor's degree and some statistical training, and who must acquire a large part of their classroom training while engaged on the internship program.

COURSES LEADING TO CERTIFIED STATEMENTS OF ACCOMPLISHMENT IN STATISTICS

With Concentration in One of the Following Fields of Application

THE SOCIAL SCIENCES

College Algebra, Plane Trigonometry and
Analytic Geometry
Principles of Statistical Analysis

THE NATURAL SCIENCES

BASIC COURSES—Required of all candidates

College Algebra, Plane Trigonometry and
Analytic Geometry
Principles of Statistical Analysis

MATHEMATICAL STATISTICS

SPECIALIZED COURSES

206. Calculus
400. Introduction to Mathematical Statistics
520. Government Statistics
727. Planning of Statistical Surveys
735. Theory of Sample Surveys
734. Statistical Methods for Research Workers
or
738. Introduction to Sampling and Statistical Inference
753. Recent Developments in Statistical Concepts

206. Calculus
400. Introduction to Mathematical Statistics
704. Interpolation, Approximation, and Mechanical Quadrature
723. Design of Experiment
731. Least Squares and Curve Fitting
734. Statistical Methods for Research Workers
738. Introduction to Sampling and Statistical Inference
749. Control of Quality by Statistical Methods

400. Introduction to Mathematical Statistics
500. Advanced Calculus
708. Linear Algebra
712. Theory of Functions
723. Design of Experiment
727. Planning of Statistical Surveys
735. Theory of Sample Surveys
739. Multivariate Analysis
740. Advanced Analysis of Variance
741. Theory and Application of the Characteristic Function
751. Theory of Measure
752. Advanced Theory of Probability

ELECTIVE COURSES

500. Advanced Calculus
502. Differential Equations
704. Interpolation, Approximation, and Mechanical Quadrature
712. Theory of Functions

709. Theory of Infinite Processes
732. Sampling in Social and Economic Surveys
741. Theory and Application of the Characteristic Function
752. Advanced Theory of Probability

The internship will consist of two integrated parts:

1. Classroom training in courses at the Graduate School, or at other educational institutions in the city. This training will be planned to strengthen previous training and to fill gaps.
2. Work experience in government agencies on large-scale statistical sampling and testing programs. The work in the social sciences will consist of assistance in the preparation of questionnaires and sampling plans; development, application, and testing of new theory; writing instructions for use in the field, in the office, and for tabulation; computation of sampling errors; computation of costs; and actual experience in interviewing. Every intern and his program must be approved by the agency to which he is assigned.

Included among the agencies to which interns will be assigned are:

Bureau of Agricultural Economics	Bureau of the Census
Bureau of the Budget	Bureau of Labor Statistics
National Bureau of Standards	

Opportunity will be given for actual field experience. Holders of internships in industrial statistics will take part in the development of the necessary statistical theory and in experimental design, and will have the opportunity of becoming familiar with actual testing practice and the development of new methods.

Each application will be reviewed and approved or rejected by the Committee on Internships in Sampling. The Committee will help the intern plan his program and will consult with him from time to time concerning his progress. The Committee will keep the university informed of progress, where the intern program is being developed as a research project.

Upon satisfactory completion of the internship the individual will be awarded by the Graduate School a certified statement appropriately descriptive of the nature, extent, and quality of the training and work experience. In the case of pre-doctorate candidates credit will be transferable under arrangements worked out in advance with the institution in which the intern is a candidate for a degree. In certain cases this work may be used, with the approval and cooperation of the degree-granting institution, as the doctoral thesis or as the basis for it. Where a student is interested in applying credit earned toward a degree or in using intern experience as a basis for a dissertation, arrangements with the institution which

is to grant the degree should be completed prior to beginning the intern program.

Applications should be made to the Director of the Graduate School and should include the following information:

- | | |
|---|---|
| (1) Name | (5) Fields of specific interest and circumstances surrounding application (i.e., purpose, whether applicant would devote full time to internship, etc.) |
| (2) Date and place of birth | |
| (3) Previous academic work | |
| (4) Citations or copies of publications or technical papers | |

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Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate (senior); above 699, graduate. Bracketed numbers, not given this year.

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MATHEMATICS

1. Review of Freshman Mathematics

Summer, non-credit

SIDNEY KAPLAN

A review course on the level of freshman mathematics. Algebra, trigonometry, analytic geometry. A brief introduction to the methods of the differential calculus. Emphasis on applications to statistical problems. *Prerequisite*: One year of college mathematics.

2. Review of Calculus

Fall, non-credit. Repeated in Summer

H. BURKE HORTON

Variables, functions, limits, divided differences, derivatives, application of derivatives to geometry, engineering curve fitting and analysis. Transcendental functions, polar equations, differentials, mean value theorem, techniques of integration and engineering application. Series and expansion of functions. *Prerequisite*: Calculus.

102. Algebra

Fall, 3 credits. Repeated in Summer

SIDNEY KAPLAN

IRVIN POLLIN

JOSEPH S. RHODES

Fundamental rules of algebra; exponents; logarithms; manipulations with proportions; identities and conditions; solution of equations; binomial theorem; numerical approximations. Uses of symbolic operators. Determinants; solution of equations by the reciprocal matrix. Theory of equations; progression; series. Permutations and combinations. Graphical methods. Emphasis on applications to statistics and the physical sciences. *Prerequisite*: High school algebra and plane and solid geometry.

104. Trigonometry

Fall, 2 credits. Repeated in Spring

SIDNEY KAPLAN

JOSEPH S. RHODES

Basic definitions and uses of trigonometric functions; logarithmic solutions; radian measure; fundamental identities; oblique triangles; polar coordinates, in-

verse trigonometric functions; complex numbers and De Moivre's theorem; graphs of the functions and the inverse functions; introduction to spherical trigonometry. *Prerequisite:* College algebra.

105. Analytic Geometry

Fall, 4 credits. Repeated in Spring

DANIEL SHANKS

Planned for students majoring in engineering. Coordinates, locus problems, the straight line and circle, graphs, transformation of coordinates, conic sections, parametric equations, solid analytic geometry, curve fitting. *Prerequisite:* College algebra and plane trigonometry.

106. Analytic Geometry

Spring, 2 credits

JOSEPH S. RHODES

Fundamental concepts and formulas; line, circle, parabola, ellipse, hyperbola; transformation of coordinates; polar coordinates; parametric equations; the second and higher degree equation in rectangular coordinates; graphic solution of equations; introduction to solid analytic geometry. *Prerequisite:* Trigonometry and college algebra.

206. Calculus

Year, 4 credits each semester

THOMAS N. E. GREVILLE
DANIEL SHANKS

First semester. Variables, functions, limits, continuity, divided differences, derivatives. Application of the derivative to geometry, physics, curve fitting, and analysis. Mean value theorem. The anti-derivative. Riemann integration. *Prerequisite:* Algebra and trigonometry and analytic geometry.

Second semester. Standard integral forms. Partial and total derivatives. Constrained maxima and minima in two variables; Lagrange multipliers. Interpolation. Taylor's series with one, two, and three variables. Propagation of errors. Series. Multiple integrals. Line integrals. Approximate integration; the Euler-Maclaurin formula for integration and summation. History and application stressed. *Prerequisite:* First semester or equivalent.

[307.] Unified Mathematics (1950-51 and alternate years)

MURRAY A. GEISLER

[500.] Advanced Calculus (1950-51 and alternate years)

502. Differential Equations

Year, 2 credits each semester (alternate years)

JOSEPH A. GREENWOOD

Various types of ordinary differential equations. Solutions in series; the methods of Frobenius and others. Mechanical methods. Partial differential equations. Boundary problems. Fourier series and integrals; Legendre polynomials. Applications to conduction of heat and vibrating strings. Laplace's equation. Calculus will be reviewed as necessary. *Prerequisite:* Calculus.

[700.] Vector Analysis (1951-52 and every third year)

[704.] Interpolation, Approximation, and Mechanical Quadrature (1951-52 and every third year)

THOMAS N. E. GREVILLE

715. Applications in Engineering Mathematics

Year, 2 credits each semester (every third year)

RICHARD K. COOK

Graded problems in engineering used to illustrate fundamental mathematical techniques and methods of reducing physical statements to mathematical

form. Exact and approximate methods of solving the resulting mathematical equations. The mathematical treatment will include calculus, series, differential equations, difference equations, Fourier series and integrals, and other devices. Text: von Karman and Biot, *Mathematical Methods in Engineering*. *Prerequisite*: A degree in engineering.

[706.] **Analytical Mechanics** (1951-52 and every third year)

RICHARD K. COOK

Linear Algebra

(See p. 42)

709. Theory of Infinite Processes

Year, 2 credits each semester (every third year)

JOSEPH H. KUSNER

Real numbers and sequences. Convergence and divergence. Infinite series. Expansion of functions in infinite series. Tests of convergence and divergence of series. Transformation of series. Numerical evaluation of series. Infinite products and their relations to infinite series. *Prerequisite*: Calculus; theory of functions advised.

[712.] **Theory of Functions** (1950-51 and every third year)

JOSEPH F. DALY

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Some of the mathematical courses offered by the Educational Committee at the National Bureau of Standards may be of interest to prospective students, particularly as some of them are not obtainable elsewhere. Persons outside the National Bureau of Standards wishing to enroll may secure additional information from the Registrar, Mrs. L. L. Chapin, at the National Bureau of Standards.

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STATISTICS

Elementary Courses

110. Graphic Methods of Presenting Statistics

Spring, 2 credits

R. G. HAINSWORTH and NELSON P. GUIDRY

Analysis of statistical data to determine what form is best for graphic presentation. Application of data to the many types of illustrations in several forms of the various classes. Rough pencil layout examples of time series charts, frequency diagrams, graphic correlation charts, pictorial symbol charts, cartograms and other illustrative examples will be prepared in class. Comparability and evaluation of individual charts and maps in a series will be analyzed. *Prerequisite*: An introductory course in statistics, Elements of Statistical Drafting, or experience approved by the instructor.

126. Introductory Statistics

Year, 2 credits each semester

HARALD C. LARSEN
C. M. PURVES

The collection of economic and census data. The presentation of data in tables and charts. Different kinds of averages. Dispersion. Introduction to index numbers. Relations between two or more variables. Introduction to correlation theory, regression, and interpretation of samples. Practice in calculations. *Prerequisite*: High school algebra and geometry.

127. Principles of Statistical Analysis

Year, 3 credits each semester

W. R. PABST

B. R. STAUBER

The aim of the course is to teach the methods of elementary statistical techniques and prepare students for advanced courses.

Elementary concepts of the statistical method; collection and uses of data; statistical terminology. Some general distribution theory. Elementary principles of design and analysis of surveys and experiments. Statistical control of quality. Distinction between enumerative and analytic problems. Acceptance sampling in industry. Regression and curve fitting. Statistical significance. Statistical tests as a basis for action. Introduction to the analysis of variance. Use of statistical tables, such as Fisher, Yates, and others. *Prerequisite:* College algebra, plane trigonometry and analytic geometry.

318. Machine Tabulation

Fall, 2 credits. Repeated in Spring

MILTON KAUFMAN

The punch-card method. Functions of the principal types of tabulating machines. Operations of the machines are demonstrated. The instruction covers basic wiring of all types of commercial tabulating equipment. *Prerequisite:* General knowledge of tabulating equipment.

319. Advanced Application of Tabulating Equipment

Spring, 2 credits

MILTON KAUFMAN

The solution of advanced problems in the application of card-tabulating equipment, including the wiring of principal machines involved. *Prerequisite:* A course in machine tabulation and knowledge of the basic wiring of tabulating equipment.

Advanced Courses

400. Introduction to Mathematical Statistics

Year, 3 credits each semester

BENJAMIN J. TEPPIG

A foundation course designed to give the student a broad introduction to modern mathematical statistics, after which he may specialize in application and do further work in mathematical statistics either for an advanced degree or a certified statement of accomplishment. General properties of sampling-distributions, with special studies of the binomial, hypergeometric, Poisson, multinomial, and normal distributions. Joint distributions of several variables. Moment generating functions. Distributions of chi-square, Student's *t*, Fisher's *z*, Snedecor's *F*, and the sample range. Distribution-free methods. Tests of statistical hypotheses. Estimation; bias, consistency, efficiency. Discriminant functions. Design of samples and experiments. *Prerequisite:* Calculus and Principles of Statistical Analysis or equivalent.

[738.] Introduction to Sampling and Statistical Inference (1950-51 and alternate years)

W. EDWARDS DEMING

741. Theory and Application of the Characteristic Function

Year, 2 credits each semester (every third year)

WALTER JACOBS

Set functions; monotone functions, Stieltjes integrals. The Fourier integral and its transform. Harmonic analysis. The characteristic function; its moment generating properties; inversion formula; property of continuity. Applications of the characteristic function. *Prerequisite:* Advanced work in statistics; advanced calculus or theory of functions.

735. Theory of Sample Surveys

Year, 2 credits each semester

MORRIS H. HANSEN, WILLIAM N. HURWITZ
and JOSEPH STEINBERG

History of sampling in social surveys. The use of statistical control in improving the quality and efficiency of the estimates. Calculation of sampling errors. Random, stratified random, purposive, double and systematic sampling. Cost function, choice of sampling unit; size and type of sample necessary to attain a stated degree of precision, and the distinction between precision and accuracy. The theory of probability is developed as necessary. The contributions of Fisher, Neyman, Yates, Cochran, and others are studied. *Prerequisite:* Principles of Statistical Analysis and Calculus.

[731.] Least Squares and Curve Fitting (1951-52 and every third year)

W. EDWARDS DEMING

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The following three courses form a two-year cycle.

708. Linear Algebra

Spring, 3 credits (alternate years)

JOSEPH F. DALY

Determinants. Theory of linear dependence. Linear equations, homogeneous and nonhomogeneous. Matrix algebra; calculation of the inverse matrix; application to linear equations. Linear transformations. Quadratic forms; the matrix and discriminant. Reduction of a quadratic form to a sum of squares. The characteristic equation; definite and indefinite forms. Pairs of quadratic forms, reduction to normal form. Properties of polynomials. Invariants, covariants, half-invariants, and annihilators. Canonical formation of binary cubicals and quadratics. Symmetric functions. Elementary divisors. *Prerequisite:* Calculus.

[739.] Multivariate Analysis (1950-51 and alternate years)**740. Advanced Analysis of Variance**

Fall, 3 credits (alternate years)

JOSEPH F. DALY

Selections from the works of Bartlett, Fisher, Neyman, Wilks, Yates. The general problem of the analysis of variance from the point of view of testing linear hypotheses. Generalizations of the multivariate case. Emphasis will be placed on applications to the design of experiments. Attention will be paid to the sampling conditions and the validity of the inference drawn. *Prerequisite:* Linear Algebra and Multivariate Analysis.

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The following four courses form a three-year cycle.

748. Introduction to Mathematical Analysis (See p. 45)**751. Theory of Measure** (See p. 45)**[752.] Advanced Theory of Probability (1951-52 and every third year)**

JOSEPH F. DALY

[551.] **Sequential Analysis of Statistical Data** (1952-53 and every third year)

JOSEPH F. DALY

Non-mathematical Courses

528. Introduction to Linear Programing

Fall, 3 credits

GEORGE B. DANTZIG and EMIL SCHELL

A systematic account of the fundamentals and recent developments in the field of linear mathematical models as applied to problems such as computing programs of large organizations and determining optimum transportation arrangements. Relations will be considered to Leontief's input-output model for analysis of inter-industry relationships and to von Neumann's theory of games. Alternative computational methods and triangular models will be presented. Guest speakers will lecture on particular phases of the subject. *Prerequisite:* Calculus.

560. Theory of Electronic Digital Computing Machines

Fall, 2 credits

EDWARD W. CANNON

Mathematical requirements for electronic digital computers. Alternative methods of sequencing automatic computers—instruction codes. Electronic computer systems and components—internal memory, control, arithmetic unit, input-output devices. Performance characteristics of electronic computers; analysis of errors. Preparation of problems for machine solution. *Prerequisite:* A bachelor's degree with major in engineering, mathematics, statistics, or physics and Principles of Statistical Analysis or equivalent.

561. Advanced Theory of Electronic Digital Computing Machines

Spring, 2 credits

EDWARD W. CANNON and SPECIALISTS

Analysis of design features of electronic digital computing machines, including treatment of control systems, arithmetic organs and memory devices. Advanced programing methods and exercises in coding problems for solution on the machines. *Prerequisite:* Theory of Electronic Digital Computing Machines.

[530.] **Seminar on Economic Models** (1950-51 and alternate years)

Arranged by EMIL SCHELL

340. Introduction to Experimental Statistics

Year, 2 credits each semester

WALTER A. HENDRICKS

A non-mathematical course in the analysis and interpretation of data from agricultural and biological experiments. Elementary probability relationships; binomial, Poisson, and normal frequency distributions; the concept of sampling error; tests of significance of differences between averages; the chi-square test as applied to differences between observed and expected frequencies; regression and correlation; and elementary discussions of analysis of variance and covariance. Numerical examples. Text: Snedecor, Statistical Methods. *Prerequisite:* High school algebra and geometry; college training in one or more of the agricultural or biological sciences; familiarity with ordinary methods of tabulating experimental data, computation of averages and the preparation of graphs.

[410.] **Agricultural Estimating Procedures** (1950-51 and alternate years)

WALTER A. HENDRICKS

545. Advanced Agricultural Estimating Procedures

Fall, 2 credits (alternate years)

WALTER A. HENDRICKS

Mathematical principles of sampling in practical agricultural estimating problems. The relation of scientific sample design to mail and interview surveys. Discussion of sampling and estimating problems encountered in the current work of Agricultural Estimates, USDA. Numerical examples. *Prerequisite:* Agricultural Estimating Procedures or equivalent.

723. Design of Experiment

Year, 2 credits each semester (alternate years)

W. J. YOU DEN

An introductory course concerned with setting forth (a) the characteristics of a good experiment, (b) experimental designs and the associated statistical techniques for analyzing the data, and (c) methods for improving the precision of experiments. The topics will be illustrated by examples. *Prerequisite:* Elementary statistics, a degree in one of the sciences, or consent of the instructor.

548. Statistical Analysis of Economic Relationships

Year, 2 credits each semester

RICHARD O. BEEN

In economic research dealing with quantitative data, the economic analyst is mainly concerned with discovering patterns of relationship among economic variables. Statistical methods designed for this purpose are the principal research tool of the economist.

First semester: statistical research in economics. Simple and multiple regression and correlation, linear and curvilinear, graphic and calculated, joint correlation, correlation matrix reduction. Evaluation and interpretation of results. Text: Ezekiel, *Methods of Correlation Analysis*.

Second semester: modern techniques for analyzing relationships; Frisch's confluence analysis by means of complete regression systems. Canonical correlation between sets of variables. New methods of analyzing simultaneous economic relationships by means of structural analysis as developed by Haavelmo, Koopmans, and others in the Cowles Commission and elsewhere. Economic time series. *Prerequisite:* Training in economics and a first year course in statistics.

Presented jointly with the Department of Social Sciences.

513. Demographic Methods and Techniques

Fall, 2 credits

JACOB S. SIEGEL

Methods and techniques of studying population. Basic sources of population data. Methods of measuring and analyzing population size, distribution, composition (age and sex), dynamics (natality, mortality, reproductivity, and migration). Use of life tables. Population estimates and forecasts. Applications to economic and social research, market research, and government planning. *Prerequisite:* Elementary statistics and studies or experience in population research.

[727.] The Planning of Statistical Surveys (1950-51 and alternate years)

A. J. JAFFE

[520.] Government Statistics (1950-51 and alternate years)

MORRIS B. ULLMAN

515. Publication of Statistical Reports

Fall, 2 credits (alternate years)

MORRIS B. ULLMAN and BRUCE L. JENKINSON

Data and their description, tabular presentation, statistical practices involved in data presentation, use of graphics, programing, and evaluation of existing statistical reports. *Prerequisite:* A course in elementary statistics.

[749.] Control of Quality by Statistical Methods (1950-51 and alternate years)

W. R. PABST

732. Sampling in Social and Economic Surveys

Fall, 3 credits

HAROLD NISSELSON

Non-mathematical survey of sampling theory and practice. Development of the basic ideas of statistical sampling, with applications in social and economic surveys. Unrestricted random, stratified, systematic, area and cluster sampling, and subsampling. Sample designs used in the United States and in foreign countries are discussed with respect to considerations of statistical efficiency, cost functions, and the administrative limitations imposed on the design. *Prerequisite:* A course in elementary statistics.

[734.] Statistical Methods for Research Workers (1950-51 and alternate years)

W. J. YOUTEN

[753.] Recent Developments of Statistical Concepts (1952-53 and every fourth year)

MORRIS B. ULLMAN and SPECIAL LECTURERS

021. Seminars in Sampling and Statistical Inference

Year, non-credit

JOHN B. BODDIE and W. EDWARDS DEMING

Annually the Department of Mathematics and Statistics conducts a series of six to eight lectures and discussions on sampling and statistical inference. These meetings, addressed by leading mathematical statisticians, are held primarily for advanced students in the Graduate School and others who are working in this field.

No fee is charged; registration, however, is required. Applications for new admissions to the seminar should be sent in writing to the Graduate School, with a statement regarding the applicant's education and experience. Notices regarding meetings are sent to those whose names are on the list.

Members of the Seminar will receive notices of meetings on statistical subjects in the Applied Mathematics Colloquium held at the National Bureau of Standards under the leadership of Dr. John H. Curtiss, Chief of the National Applied Mathematics Laboratories.

748. Introduction to Mathematical Analysis

Fall, 3 credits (every third year)

To be announced

This course is intended to bring the student into contact with the modern concepts and techniques used in the theory of probability and the theory of the integral, as exemplified in the work of Cramer, Frechet, Kolmogoroff, and Saks. Attention will be concentrated on the basic properties of the real number system, elementary operations with point sets, and applications of the idea of topological space to a general treatment of functions, limits, and continuity. The theorems developed will be essentially those involved in the standard course in advanced calculus. *Prerequisite:* Calculus.

751. Theory of Measure

Spring, 3 credits (every third year)

To be announced

Review of theory of function of a real variable. Point set theory. Riemann integration, Lebesgue measure. Lebesgue and Stieltjes integrals. Applications to the theory of probability. *Prerequisite:* Introduction to Mathematical Analysis.

Department of Office Techniques and Operations

DEPARTMENTAL COMMITTEE

VIRGIL L. COUCH (Chairman)

HENRY A. DONOVAN (Vice-chairman)

ROBERT H. FUCHS

JAMES E. HALLIGAN

STROTHER B. HERRELL

WILLIAM P. KRAMER

HAROLD LEIGH

JOHN S. LUCAS

A. R. MILLER

WILLIAM L. MOORE

ARTHUR B. THATCHER

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CLERICAL-ADMINISTRATIVE PROCEDURES

The courses described under Clerical-Administrative Procedures are closely related to those offered in the Department of Public Administration and are an integral part of the program leading to the Certified Statement of Accomplishment in Administrative Procedures. They are practical, how-to-do-it, courses chiefly of interest to persons in grade CAF-7 positions, or below, who are either working with these procedures, or who hope to train themselves for such positions, or positions requiring some familiarity with more than one of these procedural subjects (e.g., administrative assistants and head clerks). High school graduation is a basic requirement for admission to these courses; exception will be made only on the basis of proven equivalent experience.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN

ADMINISTRATIVE PROCEDURES

The program leading to a Certified Statement of Accomplishment in Administrative Procedures should be of special interest to:

1. Persons already employed in administrative work of the procedural type, emphasizing techniques and skills.
2. Employees who aspire to enter administrative work but who, because of lack of college education, find their opportunities in that field greatly limited except at the procedural level. This program of courses is useful for persons with good native ability but limited educational background, because it prepares them for a level of work most likely to be open to them. After they have succeeded in getting into administrative work, perhaps even at the clerical-administrative level, they can then combine their work-experience and study-experience to mutual advantage as progress is made toward greater responsibility. This approach is believed to be better for such persons than the common practice of attempting to circumvent the usual educational requirements by shortcut concentration on advanced and specialized courses, which are

actually preparatory for responsible positions only insofar as they *supplement* broader educational background.

3. Employees who wish to prepare to become administrative assistants or to head units concerned with administrative procedures.

Approach

Emphasis on techniques, procedures, methods, but with an attempt to understand and use these means in terms of administrative ends or objectives.

Objectives

Ultimately, for responsible conduct of important "housekeeping" operations of specialized character, direction of small units, performance of most difficult and responsible tasks in the procedural aspects of administration, and the settlement of questions of intermediate importance arising out of current or contemplated operations and not covered by existing regulations or decisions.

Immediately, for effective service in some administrative procedure at the clerical or semi-clerical level, as a means of entrance into the line of promotion leading to the responsibilities named above. (Students already at this level may arrange programs in conformity with their needs.)

Requirements

1. High school diploma or equivalent.
2. Sixteen semester hours of credit selected from the following Graduate School courses:
 - a. A minimum of eight credits must be selected from Advanced courses in Clerical-Administrative Procedures, or from courses offered in the Department of Public Administration (excluding all accounting courses except Federal Government Accounting) or a combination of these.
 - b. A course in American National Government.
 - c. The remaining credits may be selected from courses, not included above, in the Department of Office Techniques and Operations, excluding all shorthand courses.
 - d. A course in elementary statistics (not exceeding three credits) may be included. It is not required. If it is included, three credits may be deducted from *c* above.

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Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate (senior); above 699, graduate. Bracketed numbers, not given this year.

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CLERICAL-ADMINISTRATIVE PROCEDURES

108. Administrative Procedure

Fall, 2 credits. Repeated in Spring and Summer

THOMAS J. HICKEY
EARL D. SHARAR

Intended for persons who wish to become supervisors or administrative assistants or who are now serving in such capacity in a small organizational unit. Deals with the "HOW" aspects of the day to day assignments for which these persons ordinarily are responsible, such as preparation of budget data for small organizational units; preparation of recommendations on personnel actions in a typical organization; the maintenance of office records; orientation and assignment of new employees; essential requirements for good supervision.

The second part of this course deals with the introduction to administrative planning, administrative procedures and management generally at the lowest organization level, including work reporting and work measurements, work processes and work control reports; relation of these studies to the budgetary and personnel needs of the unit; and the theory of staff versus operating jurisdiction over administrative planning.

208. Advanced Administrative Procedure

Fall, 2 credits. Repeated in Spring

JOHN D. MOSELEY

Intended for persons who are now assigned to administrative assistant and supervisory positions. Deals with (1) the conduct of administrative and procedural surveys and audits directed toward the development of factual data for management purposes; the analysis of these data, the preparation of reports and recommendations thereon; (2) the putting into effect of the approved recommendations through the actual drafting of procedural instructions and the designing and standardization of forms; (3) the installation of approved procedures and the establishment of executive controls to insure compliance with approved instructions; (4) the modern and tested techniques and methods ordinarily used in developing factual data and graphic presentations regarding flow of work, organization structure, work assignments, authority, work duplications, delays and bottlenecks; (5) report writing; (6) the value of illustrated presentations of work processes in eliminating duplication of work, in simplifying operations and in cutting out unnecessary steps; (7) the value of and the need for specific written manuals of instructions as tools of management; and (8) the relation of these instructions to those taught in the other Office Techniques and Operations Courses. *Prerequisite:* Completion of one of the following courses in Office Techniques and Operations: 108, 110, 112, 113, 114, 115, 116, 117.

101. Business Mathematics

Fall, 2 credits. Repeated in Spring and Summer

RALPH R. BOTTS

Designed for clerical workers who are called upon to apply fundamentals of arithmetic to their jobs. Emphasis will be placed on review of business arithmetic including fractions, ratios, proportion, percentages, common divisors and multiples, progressions and elementary graphs and statistics. Special applications will be made to business problems such as simple interest; simple, bank, cash and trade discount; profit and loss; sales turnover; equation of partial payments and accounts; commuting debts; compound interest; compound discount; and annuities. Use of calculating machine will be explained.

110. Federal Auditing Procedure

Fall, 2 credits. Repeated in Spring and Summer

CAREY G. CRUIKSHANK

This intensive one-semester course is intended for those having no previous knowledge of the subject and is designed to furnish fundamental training for employees now in lower grades as clerks, typists, machine operators, etc., who

intend to take the course on Advanced Federal Auditing Procedure or who have opportunities of eventually becoming auditors by serving apprenticeships. It covers explanations of, discussions on and practice work with the two most common types of Government vouchers; deals with, to a limited extent, certain related documents and procedures and should prepare students for higher grades and better-paying positions. The Manual outlines in detail various pertinent procedures.

Embraces general and basic principles; definitions of terms, description and use of standard forms involved, authorizations and allocations; general procedure in auditing standard form 1034 vouchers; suspensions and disallowances, General Accounting Office exceptions and replies; purchase order procedure and its relation to auditing; tax exemption procedure and its effect upon auditing; general procedure in auditing standard form 1012 vouchers; authority for travel, emergency travel per diem allowances, method of computation; methods of travel, duty status and leave, application of statutes, regulations and Decisions of the Comptroller General; exigency statements, special correspondence; and practice audit work on standard form 1034 "purchase" vouchers and standard form 1012 "reimbursement" vouchers.

210. Advanced Federal Auditing Procedure

Spring, 2 credits

EMMETT B. COLLINS

Includes explanations of and discussion on Federal auditing policy and practice along advanced lines. Covers the relationship of auditing to general fiscal control; administrative examination of fiscal documents; application of legislation and regulations; use of Comptroller General Decisions; relation of Comptroller General's Decisions to particular cases; normal methods of handling suspensions, disallowances, certifications, etc.; unusual problems in the audit of standard form 1034 vouchers and 1012 vouchers; relationship of procurement to auditing and the policies followed in the use of purchase orders; authority for travel and policies relating thereto; per diem allowances and computations, and policies respecting rates; transportation of property and personnel, use of transportation requests and bills of lading; audit of transportation vouchers; audit of payrolls and application of payroll procedures; General Accounting Office exceptions and preparation of replies; claims, adjustments and direct settlements. This advanced course in Federal Auditing Procedure is designed to assist auditors to prepare themselves for more responsible and more remunerative positions. *Prerequisite:* Federal Auditing Procedure or equivalent experience.

112. Federal Accounting Procedure

Fall, 3 credits. Repeated in Spring and Summer

JOHN L. TIERNEY

Designed particularly to train accounting clerks through instruction of employees now working in lower grades and to assist accounting clerks in present and prospective positions. It embraces explanation of, discussion on, and practice work with the basic ledgers (allotment ledger, objective classification ledger, and general ledger) maintained in connection with funds made available to Federal agencies. Appropriation, apportionment, allotment, disbursement, collection, and reporting processes will be discussed and the relationship between administrative accounts and accounts kept by the Treasury Department and the General Accounting Office explained.

116. Federal Budgetary Procedure

Fall, 2 credits. Repeated in Spring

ERNEST L. STRUTTMANN

This course is designed to assist employees either in budget work or preparatory to taking budget work, up to and including Grade CAF-9. It deals with budgetary procedures, including the preparation of estimates, justifications, tabular statements, graphs, etc., and, in connection with budget execution, outlines methods in making allotments, operating budgets, analysis of reports, preparation of apportionment and obligation reports, and other methods used in the formulation and execution of the Federal budget.

[122.] Federal Payroll Procedure (1950-51 and alternate years)

LOUISE M. KRUEGER

115. Federal Purchasing Procedure

Fall, 2 credits

JAMES SCAMMAHORN

Elementary principles and ethics of Federal purchasing in general and its relation to operating programs; historical background; organization for purchasing; purchasing and contracting authority; basic practices and procedures with legal and administrative background; use and preparation of requisition, purchase order, bid, bill of lading; voucher and other procurement forms; sources of supply such as Federal Supply Schedules, Government warehouses, prison industries, blind-made products; surplus disposal agencies, commercial market, and how to use such sources; open market and bid purchases; leasing of space; preparation, inviting and award of bids, including fundamentals of writing specifications; advertisements in publications; formal contracts, including source of supply contracts, and bid and performance bonds; inspection of deliveries for compliance with specifications; trade-in of equipment; procurement of special items.

113. Federal Property Procedure

Fall, 2 credits

PERCY M. LUM

An elementary course covering principles and procedures in property utilization, accountability, and disposal of Federal property. It is designed to furnish persons currently employed in this field an opportunity to learn the mechanics of their day-to-day jobs through a short intensive study of the prescribed policies and regulations and accepted practices. The chief objectives of the course are to acquaint the student with the essential operations in connection with: property inventorying; accountability records and controls; borrowing and loaning; lost, damaged, or destroyed property; development and application of equipment utilization and replacement standards; transfers and disposals; sales; donations; destruction or abandonment; determination of requirements; management through inventory controls; nomenclature; and statistical reporting of motor vehicle operation.

114. Federal Personnel Procedure

Fall, 2 credits. Repeated in Spring and Summer

VERNA C. MOHAGEN

Deals with the elementary principles and procedures of Federal personnel administration, including a study of the Federal personnel structure and organization, history and progress of the merit system, rules and regulations of the Civil Service Commission, and other basic procedural sources; use of personnel forms, records and files systems; Civil Service examinations and recruitment; appointments; transfers; promotions; separations, terminations and reductions in force; suspensions and disciplinary actions; retirement; efficiency ratings; leave and hours of duty; personnel reports, applications of Decisions of the Comptroller General, administrative policy statements, and administrative orders.

214. Advanced Federal Personnel Procedure

Fall, 2 credits. Repeated in Spring

EUGENE J. PETERSON

Similar to Federal Personnel Procedure but more thorough in its treatment of the subject. Deals with advanced principles and techniques in Federal personnel procedures and their relation to operating programs, including a study of the principles of the Civil Service Act, Rules and Regulations, and their application to day-to-day problems in a Federal personnel office; recruiting sources for Civil Service examinations and appointments; study of promotion-

from-within procedures; reduction-in-force procedures, and their application to specific operating situations; policies and their procedures for the handling of veterans' problems including placement of returning veterans; study of procedures for systematic retirement of employees reaching annuity age; procedures for investigation and enforcement of discipline; periodic reports and their use for operating purposes; procedure and policy statements in the general field of personnel administration; procedural source materials such as the Civil Service Commission, Federal Personnel Manual, Decisions of the Comptroller General, Executive Orders, etc., and applying them to detailed operating procedures; relationship of the personnel office to budget, accounting, payrolling, and other staff functions. *Prerequisite:* Federal Personnel Procedure or equivalent practical experience in a Federal personnel office at Grade CAF-4 or above.

117. Records Management Procedure

Fall, 2 credits

L. E. DONALDSON, DOROTHY M. LUTTRELL,
and ROBERT H. LANDO

Instruction in basic practices and procedures for maintaining and servicing Government records including mail and messenger service. Includes detailed instructions and actual practice in methods of recording communications, and classifying, coding, indexing and filing correspondence and other documents. Designed for students who desire to enter this field or who are interested in supplementing their knowledge of the mechanics of record keeping.

217. Advanced Records Management

Spring, 2 credits

L. E. DONALDSON, DOROTHY M. LUTTRELL,
and ROBERT H. LANDO

Designed to give the student a comprehensive knowledge of the management of Government records. Principles of good records management; the organization and functions of records offices; planning and simplifying procedures; work flow; space arrangement; and system selection and installation. Also includes a discussion of laws and regulations governing preservation and disposal of records, appraisal, systematic retirement, storage, disposal and microphotography. *Prerequisite:* Records Management Procedure or equivalent or consent of instructor.

413. Office Management

Fall, 2 credits. Repeated in Spring

DANIEL M. BRAUM

Designed to give supervisors and administrative assistants familiarity with the fundamental principles and methods needed by them to do a satisfactory management or supervisory job. Deals with the common day to day administrative problems and questions encountered by supervisors such as, (1) determination of space requirements and proper space allocation with due regard to flow of work; (2) the utilization and care of all existing facilities—equipment, labor saving devices, communications, etc.; (3) discussion of the effect of heat, light and ventilation on the morale and output of employees; (4) development and use of management tools in the Federal Government; (5) planning for improvements—how to secure participation by officials, supervisors and employees in suggesting and making improvements; and (6) a treatment of many management aides and devices not specifically covered in other Graduate School courses.

GOVERNMENT LETTER, REPORT, AND PROCEDURAL WRITING

120. Government Letter Writing

Fall, 2 credits. Repeated in Spring

VERNE L. SAMSON

The writing of clear, accurate, concise, courteous letters and memoranda contributes to efficiency and economy in administration. This course gives the student (1) opportunity to work out the principles of effective letter writing; (2)

practice in criticizing and revising outgoing correspondence, and in planning and drafting replies to incoming letters; and (3) drill in the fundamentals of good writing.

420. Procedure Systems and Methods of Developing Instructions

Fall, 2 credits

TEN M. F. ALLSMAN and KAY PEARSON

A study of (1) various types of procedure or directives systems, (2) kinds of individual issuances, and (3) methods used in developing and writing instructions and procedures. Special attention will be given to the various types of survey methods and when to use them. The course will cover all steps in developing a procedure from the time of initial planning through the revision of installed procedures. Technical procedure functions (such as codifying and indexing), development of standards for editing and format, and types of visual presentations will be included. The purpose of the course is to provide a technical background for evaluating various procedure systems and methods for those students who will write procedures.

421. Writing Procedures and Instructions

Spring, 2 credits

TEN M. F. ALLSMAN and KAY PEARSON

A course of instruction in how to develop and write manual issuances, circulars, office memoranda, and other forms of rules, regulations, instructions, and procedures. Special attention will be given to ways of improving readability of such material, the use of a clear, simple style of writing, proper format, and use of "ready-reference" aids. It will provide drill in the practical application of principles and theories of procedure to actual writing. The purpose of the course is to provide students with group experience in writing procedures and instructions and in applying editorial and format standards. *Prerequisite:* Procedure Systems and Methods of Developing Instructions or one year of experience in writing procedures at grade CAF-5 or above.

SHORTHAND

These courses are designed to furnish Federal employees an opportunity to follow a program of training for stenographic careers in the Federal service. While each course represents a separate unit of study, with emphasis on material used in the Federal service, a proper sequence of courses insures a sound foundation for successfully qualifying for the various grades and classifications of stenographers in the Federal service.

"Review of Gregg" will serve as rapid review for the student who has not applied his shorthand knowledge for a long time, or has used it so little that he feels uncertain about applying his knowledge to practical office dictation. Students finishing "Beginning Gregg Shorthand I" may continue with "Beginning Gregg Shorthand II" and then take "Gregg, 60 to 80 Words." Because the "Gregg, 100 to 130 Words" course is an intensive course on technical material, students should have a sound foundation in theory and be able to write 100 words a minute with a 95 percent accurate transcript before registering for the course. Home study is

required to attain goals set in course descriptions. Amount of study required varies according to the learning habits and individual goals of students.

A prerequisite for all shorthand courses is the ability to type-write with a fair degree of accuracy and speed.

As a general guide to assist employees who wish to plan a course of study to build for a stenographic or stenographic-reporting career in the Federal service the following parallels are drawn:

<i>Course</i>	<i>Goal</i>	<i>Prerequisites</i>
I. Beginning Gregg Shorthand I	Thorough knowledge of shorthand theory up to disjoined prefixes and suffixes; mastery of brief forms; ability to write legible outlines and to take dictation of new and practiced material; ability to read shorthand plates at a fairly rapid rate.	For those who have not studied shorthand, or for those who have some knowledge of shorthand but have not completed basic theory.
II. Beginning Gregg Shorthand II	Completion of theory; mastery of prefixes, suffixes, special forms, and abbreviated words; ability to take dictation of business letters and standard test material at 60 words a minute and to produce mailable transcripts.	For those who have completed "Beginning Gregg Shorthand I" or its equivalent.
III. Gregg Shorthand, 60 to 80 Words	Theory review; ability to take dictation at 80 words a minute for 5 minutes; ability to produce acceptable transcripts of letters and reports dictated at rates varying from 60 to 80 words a minute.	For those who have completed Shorthand I and II or equivalent theory and dictation courses and who have a minimum speed of 60 words a minute on new, standard material.
IV. Gregg Shorthand, 80 to 100 Words	Ability to take dictation of new, standard material at 100 words a minute for 5 minutes; ability to produce, at a good rate of speed, accurate transcripts of letters, reports, conferences, and telephone conversations.	For those who have a minimum dictation speed of 80 words a minute and who are able to produce accurate transcripts of letters and reports.

<i>Course</i>	<i>Goal</i>	<i>Prerequisites</i>
V. Gregg Shorthand, 100 to 130 Words	Ability to take dictation of new, standard material at 130 words a minute for 5 minutes; ability to produce, at a good rate of speed, accurate transcripts of letters, reports, conferences, and telephone conversations.	For those who have a minimum dictation speed of 100 words a minute and who are able to produce accurate transcripts of letters and reports.
VI. Introduction to Reporting—Gregg, 130 to 150 Words	Ability to record conferences and hearings 60 to 70 percent verbatim; introduction to reporting techniques.	For those who have qualified on 130-word a minute standard tests or their equivalent.
VII. Reporting—Gregg, 150 Words and Up	Ability to use high-speed short-cuts and advanced reporting methods; verbatim reporting of lectures, hearings, and conferences.	For those who have qualified on 150-word a minute standard test or the equivalent.

89. Review of Gregg Shorthand

Fall, non-credit. Repeated in Spring and Summer

BERNIECE H. DWYER

A review of theory and brief forms. Reading from shorthand plates and students' own notes; dictation of standard material at various progressive rates of speed. *Prerequisite:* Completion of the Gregg Manual or its equivalent by the functional system.

129. Beginning Gregg Shorthand I

Fall, 3 credits. Repeated in Spring and Summer

KATHRINE WILKEY

130. Beginning Gregg Shorthand II

Fall, 3 credits. Repeated in Spring and Summer

KATHRINE WILKEY

225. Gregg Shorthand, 60 to 80 Words

Fall, 3 credits. Repeated in Spring and Summer

ETHEL W. MORGAN

226. Gregg Shorthand, 80 to 100 Words

Fall, 3 credits. Repeated in Spring and Summer

RALPH ROWLAND

231. Gregg Shorthand, 100 to 130 Words

Fall, 3 credits. Repeated in Spring

FAIRAH L. CRUZAN

335. Introduction to Reporting—Gregg, 130 to 150 Words

Fall, 4 credits. Repeated in Spring

BERNARD P. FOOTE

336. Reporting—Gregg, 150 Words and Up

Fall, 4 credits. Repeated in Spring

BERNARD P. FOOTE

Department of Physical Sciences

DEPARTMENTAL COMMITTEE

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CHARLES E. KELLOGG

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L. B. TUCKERMAN

HARRY WEXLER

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Courses offered in this department reflect the dependence of governmental functions on the principles and applications of the physical sciences. Unusual opportunity is afforded for advanced study in special fields under the guidance of scientists whose professional interests are directed to the subjects of their courses. Other courses are designed to provide basic training for entrance to or advancement in the professional scientific occupations.

Familiarity with the fundamentals of the physical sciences, short of a working knowledge, is widely recognized as a useful asset to those whose cultural or professional interests are directed to the economic and social aspects of government. Accordingly, the curriculum of this department includes facilities for securing formal instruction in the fundamental sciences.

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Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate (senior); above 699, graduate. Bracketed numbers, not given this year.

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CHEMISTRY

100. General College Chemistry

Year, 4 credits each semester (alternate years)

ROBERT G. WILLIAMSON

This course presents the fundamental principles of chemistry and shows their applications to everyday life. It attempts to develop an understanding of scientific methods of problem solving and to develop scientific attitudes.

First semester: Chemical principles, the gas laws, the kinetic theory, atomic structure and the classification of the elements, valence, oxidation and reduction, the solid and liquid states, solutions, and ionization. The laboratory work consists of experiments which parallel the lectures.

Second semester: Chemical equilibrium, reaction rates, solubility product constants, hydrogen ion concentration, the colloidal state, catalysts, metals and their compounds. The laboratory work consists of a study of the qualitative analysis of the more common cations and anions.

The class meets in the Chemistry Laboratory of Wilson Teachers College, 11th and Harvard Sts., N. W.

[248.] Organic Chemistry (1952–53 and every fourth year)

ELLIS HAWORTH and ROBERT G. WILLIAMSON

[250.] **Quantitative Analysis** (1950-51 and every fourth year)

ELLIS HAWORTH

400. Advanced Organic Chemistry

Year, 2 credits each semester

C. VERNE BOWEN

An advanced course in principles of organic chemistry. Reactions of the aliphatic, aromatic, carbocyclic and heterocyclic compounds will be considered. Newer developments will be presented. This course may be used as a refresher course. *Prerequisite:* Organic chemistry.

349. Physical Chemistry

Year, 2 credits each semester (alternate years)

WALTER J. HAMER

Lecture course on the fundamental laws of chemical reactions. Correlations between molecular structure and physical and chemical properties of matter are considered. The principles of thermodynamics, thermochemistry, chemical equilibrium, and chemical activation are discussed. Other topics include the phase rule, eutectic mixtures, and cooling curves; colloids; adsorption; solutions; ionization and electrolytic conductance; electrode potentials; speed of reactions; effects of radiation on chemical reactions; industrial distillation problems; isotopes; and radioactivity and transmutation of the elements. *Prerequisite:* One year general chemistry; calculus; or permission of the instructor.

312. Chemistry of Foods—Fruits and Vegetables

Spring, 2 credits

JOSEPH S. CALDWELL

Basic principles of the chemistry of fruits and vegetables with special reference to their preservation. Variety and stage of maturity as related to nutritive value and acceptability. Desirable and undesirable changes resulting from preservative processes. Advantages and limitations of various methods of preservation. Choice of a method with various classes of material. *Prerequisite:* Inorganic Chemistry; a course in physics desirable.

315. Elementary Biochemistry

Year, 2 credits each semester (alternate years)

CARTER D. JOHNSTON

The first semester's material will cover pH, oxidation-reduction, the chemistry of carbohydrates, fats, proteins, and the fundamentals of enzyme chemistry. The second semester will deal with the digestion and absorption of food, intermediary metabolism, excretion, vitamins, and hormones. Lectures, discussion, and examinations. *Prerequisite:* Organic chemistry.

[522.] **Advanced Biochemistry** (1950-51 and alternate years)

CARTER D. JOHNSTON

[762.] **Electrochemistry** (1950-51 and alternate years)

WALTER J. HAMER

GEOGRAPHY AND GEOLOGY

[420.] **Physiography of Eastern United States** (1950-51 and alternate years)

LOUIS L. RAY

421. Physiography of Western United States

Fall, 2 credits (alternate years)

LOUIS L. RAY

A survey of the physiographic provinces and sections of the United States lying west of the Central Lowland. The work of the course will involve lectures, informal discussions, reviews of significant papers, and map studies, with special emphasis on the geologic foundations of land forms. *Prerequisite:* Courses in physical and historical geology.

The following courses in geology are offered in cooperation with the United States Geological Survey and will be given in its well equipped laboratories. They are designed strictly for graduate students, and will enable employees to continue geologic studies while stationed in Washington. However, registration in these courses is not limited to employees of the Geological Survey.

The prerequisite for enrollment is a bachelor's degree in geology or the equivalent as an undergraduate major in geology from an acceptable institution; within this background, specific prerequisites are indicated under the course descriptions.

640. Principles of Ore Deposition

Fall, 3 credits (alternate years)

FRED M. CHACE and SPECIALISTS

Includes modes of origin and emplacement of metallic mineral deposits, nature and origin of ore-forming solutions, structural factors in ore deposition, and related topics of a fundamental nature. *Prerequisite:* Bachelor's degree in Geology with courses in mineralogy, petrology, general economic geology, and structural geology.

641. Advanced Dynamic Geology

Spring, 3 credits (alternate years)

WILLIAM T. PECORA and SPECIALISTS

Includes constitution of the earth, origin and constitution of magma, isostasy and isostatic adjustment, mechanics and theories of deformation, seismic disturbances, and similar topics of a fundamental nature. *Prerequisite:* Bachelor's degree in Geology with courses in general and historical geology, structural geology, mineralogy and petrology.

[642.] Advanced Structural Geology (1950-51 and alternate years)

WILLIAM T. PECORA and SPECIALISTS

SOIL SCIENCES**156. Soil Conservation**

Spring, 2 credits

J. GORDON STEELE

The soil as a resource and why we need to conserve it. Brief review of physical features and land use in the United States as they affect soil conservation. Properties of soil and water. Erosion processes. Farm conservation plans, including the land inventory and the choice and application of conservation practices on the farm. Community action through soil conservation districts. Estimates of the conservation job.

A knowledge of farming, and some previous training in earth sciences, biology or other related subjects are desirable but not essential. Outside readings students.

157. Soil Fertility and Management*

Fall, 3 credits

ROBERT Q. PARKS

Factors that determine the fertility of the soil and its response to fertilization, liming, green manuring, and other practices are developed. Attention is given to the determination of fertilizer needs and the use of fertilizers in relation to soil conditions, crops grown, and the development of a management system on the individual farm. The properties and use of commercial fertilizer materials and mixtures are discussed.

531. Soils: Their Morphology, Genesis, and Classification

Spring, 3 credits

CONSTANTIN C. NIKIFOROFF

The nature of soils and the broad principles governing their behavior are first discussed, followed by consideration of soil morphology, formation, and classification. Particular attention is given to characteristics of the great soil groups and their genesis in relationship to the physical and biological forces of the environment. Soil geography of the United States is dealt with broadly, but some examples from other parts of the world are used. Throughout the course, relationships of soil characteristics to agricultural development, soil use and conservation, and patterns of human occupancy are emphasized. *Prerequisite:* Freshman chemistry or its equivalent. Previous or collateral reading in plant physiology, geology, geography, and logic would be helpful, but not essential.

METALLURGY**452. Principles of Physical Metallurgy**

Fall, 2 credits

BLAKE M. LORING

Development, meaning, and use of equilibrium diagrams for binary alloys. Iron-carbon diagrams and their relation to cast iron and steel, and to the critical points important in heat-treating ferrous alloys. Steel-treating processes depending on non-equilibrium conditions, including the TTT-Curve. Alloy steels. Aging and precipitation hardening. Segregation and other ingot defects. Mechanical and physical tests, including the interpretation of micrographs. Non-ferrous alloys of industrial importance. *Prerequisite:* College chemistry and physics.

526. Advanced Physical Metallurgy

Spring, 2 credits

BLAKE M. LORING

Basic concepts of the physics of metals are discussed in order to develop a better understanding of the common mechanical tests and manufacturing processes. Topics include: definition of a metal; introduction to the crystalline nature of matter; classification of metallic elements according to crystalline structure; relationship between crystalline structure and physical properties; the equilibrium diagram and its relation to physical properties and crystalline structure; introduction to X-ray metallography with calculations from diffraction patterns of metals (illustrated); X-ray evidence of cold working and recrystallization; internal stresses in metals; plastics deformation; theory of metal hardening, ferrous and non-ferrous; diffusion and diffusion processes. *Prerequisite:* Principles of physical metallurgy.

METEOROLOGY**162. Principles of Meteorology**

Spring, 2 credits

CHARLES B. JOHNSON

A course of a descriptive nature explaining the principles of meteorology essentially on a non-mathematical basis. Especially adapted to preparation for sub-professional employment in the Government and to obtaining the basic

* To be given at the Plant Industry Station, Beltsville.

meteorological knowledge required of a civilian pilot. Arrangements will be made to study forecasting and observing techniques at the Washington National Airport.

310. Methods and Application of Climatology

Year, 2 credits each semester

WOODROW C. JACOBS
H. C. S. THOM
and SPECIALISTS

A study of modern climatological methods with emphasis on statistical analysis as applied to meteorological data.

The second semester will include special applications to weather problems of business, industry and agriculture. A knowledge of elementary statistics is helpful but not a prerequisite.

533. Hydrology

Year, 3 credits each semester (alternate years)

RAY K. LINSLEY

A two-semester course in basic and applied hydrology at the professional level. The first semester will be largely descriptive, covering such topics as elementary hydraulics; measurement and interpretation of streamflow, precipitation and other basic data; the hydrologic cycle; physics of soil moisture; the infiltration theory; wave travel and the unit hydrograph. The second semester will cover the development and application of procedures for applying basic hydrology to practical problems of river forecasting and design of water control works including such subjects as streamflow routing, flood frequency, the rational method of estimating flood magnitude, hydrometeorology, forecasting of runoff, influence of water control structures on streamflow, and problems of water control operation. *Prerequisite:* Physics and algebra; elementary meteorology, statistics, and engineering desirable.

534. Introduction to Dynamic Meteorology

Year, 2 credits each semester (alternate years)

ROBERT J. LIST

Designed to illustrate the use of higher mathematics and physics in the interpretation of meteorological phenomena, and in the development of forecasting techniques. *Prerequisite:* Calculus, or consent of the instructor.

536. Physical and Synoptic Meteorology

Year, 3 credits each semester

ALEXANDER L. SHANDS

A two-semester course in the fundamentals of modern meteorology for the professionally interested student. The first semester stresses the physical aspects—atmospheric composition and structure and their measurement; gas laws; adiabatic, pseudo-adiabatic, and non-adiabatic processes; thunderstorms; fog; wind. The second semester stresses synoptic features—general and local circulations, air masses, fronts, cyclones and anticyclones, upper-air charts, forecasting. Problems involving basic units and graphic manipulations will be assigned. *Prerequisite:* Physics and algebra; trigonometry and elementary meteorology desirable.

537. Weather Analysis and Forecasting

Year, 3 credits each semester

THOMAS I. GRAY, JR., and JAY S. WINSTON

This course provides practical experience in the analysis of various weather charts of sea level and the upper air. Considerable practice is given in preparing weather forecasts from various sea-level, upper-air and local surface data. Lecture and laboratory. *Prerequisite:* Physical and synoptic meteorology.

580. Advanced Weather Analysis and Forecasting

Spring, 3 credits (alternate years)

THOMAS I. GRAY, JR., and JAY S. WINSTON

Weather data not only for the North American area, but also for various other areas of the earth including the tropical and polar regions are analyzed.

Important forecasting problems, such as cold waves, heat waves, heavy rain, snow and ice storms, widespread fog conditions, icing, hurricanes, and tornadoes are investigated. Specialized forecasting and information for various industries such as air transportation, shipping, agriculture, forestry, and sports are discussed. More detailed and experimental analysis of data is emphasized, including: study and use of isentropic charts, constant vorticity trajectories, vertical motion computation, jet stream analysis, frontal contour charts, and nephanalysis. Methods of extended period forecasting (as practiced by the U. S. Weather Bureau) are presented. *Prerequisite:* Weather Analysis and Forecasting or equivalent, or two years' experience in analysis and forecasting.

PHYSICS

153. College Physics

Year, 4 credits each semester

WILLIAM A. KILGORE

An introductory college course consisting of lectures, demonstrations, and individual laboratory work.

First semester: Mechanics, heat, and sound, with major emphasis upon the concepts of mechanics.

Second semester: Light, electricity, and electronics, with major emphasis upon electricity.

The class meets in the Physics Laboratory of Wilson Teachers College, 11th and Harvard Sts., N. W. *Prerequisite:* Two years high school mathematics and one year high school physics or equivalent.

430. Introduction to Modern Physics

Year, 2 credits each semester (alternate years)

MARTIN A. GARSTENS

Photoelectric and thermionic effects, the theory of relativity, the origin of spectral lines, wave mechanics, atomic structure and optical spectra, X-rays, nuclear physics and cosmic rays. *Prerequisite:* Two years of college physics and calculus, or consent of instructor.

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NATIONAL BUREAU OF STANDARDS EDUCATIONAL COURSES

The Educational Committee of the National Bureau of Standards has developed a series of courses to provide graduate training in physics. The courses are of graduate grade and are recognized by many of the leading universities in granting credit for advanced degrees. Although these courses are planned primarily for members of the staff of the National Bureau of Standards and are given at the laboratories of the Bureau, other qualified students may enroll.

Besides the out-of-hours graduate courses, the National Bureau of Standards has organized a large number of highly specialized in-hours courses to train members of the staff in their special work. Although these courses are planned primarily for members of the Bureau staff, individuals from other Government agencies may be admitted on official request from their agencies.

Information about courses may be obtained from the Registrar, Mrs. L. L. Chapin, at the National Bureau of Standards.

Department of Public Administration

DEPARTMENTAL COMMITTEE

WILLIAM G. FINN (Chairman)	
GLADYS L. BAKER	EARL W. LOVERIDGE (Vice-chairman)
K. A. BUTLER	WILLIAM A. MINOR
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OPPORTUNITIES FOR STUDY AND WORK

The importance of public administration is apparent in the modern state with its emphasis on services, control, operation, and collective action in the public interest. The more the public service is called upon to assume functions previously exercised by individuals or private enterprise the greater the importance of the principles and techniques of public administration. Management problems raised by the war and its aftermath illustrate the critical need for more and better training in public administration, particularly in the junior and assistant positions, even in normal times. The increasing delegation of discretion to administrative agencies has raised unprecedented problems of organization, public consent, and administrative responsibility.

Washington is of necessity the national focal point of all these developments. Many of the ablest and most experienced public administrators are assembled in Washington. Many of the most competent practitioners of the various specialized branches of administration are likewise concentrated in Washington. Utilizing this unique environment and this unexcelled talent, the Graduate School offers courses geared to demonstrated needs and taught by experienced administrative personnel.

SUGGESTIONS FOR PROGRAM OF STUDY

Courses in this Department cover a wide range of approaches for varying levels of responsibility. Some give background and attitude, and some give methods and skill. Some have their objectives high and broad for perspective and knowledge of relationships; some have their objectives comparatively narrow and sharply focused for skill and ability to perform particular tasks. It is hoped that students will select those courses which supplement and complement their work assignments rather than concentrate exclusively on more intensive training in the performance of daily tasks.

General Administration. Students whose livelihood and daily work are in public service, whose daily work is restricted to the

unique conditions surrounding public enterprise, are usually dependent on organized instruction on modern developments in management of private enterprise. The adaptation of these developments in the private field upon the organizations and procedures of public enterprise has sometimes had little and at other times a marked effect. A new series of courses has been added to bring together the scientific management developments of private industry and those of public enterprise in comprehensive and integrated training in general administration. These courses offer the student a basic and rounded training in administration, not exclusively concerned with existing organizations and procedures of Federal administration but combining pertinent experience that non-Government enterprise has to offer.

The first in this series of five courses is concerned principally with management in private enterprise and provides a background of reference and comparison for subsequent courses in this group, stressing management in public enterprise. The second course, emphasizing public administration, inquires into the extent to which the principles and procedures of private enterprise as developed in the first course are applicable in public service. The third course concentrates on problems and methods of top executive control in Government. The fourth course deals with the internal organization patterns and supervision in Government. The fifth and final course in this group is concerned with one of the most important tools employed throughout the entire area of operations in private enterprise and to a limited extent in Government—work standards and work measurement—and explores its adaptability for more extensive use in Government.

Students successfully completing this series of five courses will be awarded a special Certificate in General Administration.

In addition to these five courses, in general administration, the background courses in this Department provide a general foundation in American government and its legislative processes. They give the student an understanding of the theory and structure of our government and of democracy at work so that he, as a public servant, may better appreciate the paramount importance of the citizen. Knowledge of the way American citizens control their government and an understanding of the master-servant relationship between citizens and employees permits an intelligent handling of governmental affairs.

Financial and Budgetary Administration. Students desiring a knowledge of how the Government obtains, budgets and manages its money will find helpful several of the background courses and some of the courses in general administration as well as the specialized courses in this division. Those with limited experience in this

field will wish to begin their study with Federal Budgetary Procedure, continue with Financial Organization and Procedures of the Federal Government, before attempting the advanced course in Budget Formulation and Budget Execution.

Organization and Methods Analysis. These courses are offered to afford students an opportunity for progressive study and advancement in the general field of organization and methods work (hereafter called O&M work).

The courses use to advantage, among other background data, the instructional and case materials developed by the Bureau of the Budget and by other governmental agencies. A student progressing through these courses should develop a well balanced understanding of the principles, techniques, and administrative aspects of O&M work. The courses are designed for students with varying degrees of experience in this field.

Students interested in this area will find useful the scientific management courses under general administration; for scientific management as found in industry is, in part, translated and applied to governmental operations.

Personnel Administration. The student is urged to begin with the background courses in public administration before concentrating on the program in this division. Unless substantial experience can be substituted, the general course, Personnel Administration, should be taken before the specialized courses (such as Position Classification, Selection and Placement, etc.). Persons who are in positions classified as Grade CAF-5 or below and desire to prepare for personnel work should begin with Federal Personnel Procedure; they should not attempt to take the specialized courses until they have gained substantial experience in personnel work or have carefully laid a foundation by completing all basic, general courses.

Procurement and Property Management. Courses in this area deal with how the Government purchases, manages and accounts for materials and supplies. Those interested in purchasing but with limited experience, will find it helpful to begin with the courses in Federal Purchasing Procedure and Federal Property Procedure before attempting the management courses.

Selected background courses in public administration together with courses in the Division of General Administration will provide a thorough training in administration in this area.

Accounting and Auditing. Students in classification grades below CAF-5 will find it advantageous to begin with Federal Accounting Procedure or Federal Auditing Procedure. Preparation for higher-level accounting should begin with a year's study of Principles of Accounting, after the completion of which Federal Government Accounting may be taken. Intermediate Accounting, Cost

Accounting, Auditing, Federal Tax Accounting, Advanced Accounting Problems, and Analysis and Interpretation of Financial Statements provide advanced training for those who desire to progress further with a general accountancy program. (See p. 75 for Certified Statement of Accomplishment in Accounting.)

COMMITTEE ON CERTIFIED STATEMENTS OF ACCOMPLISHMENT
IN PUBLIC ADMINISTRATION

GLADYS L. BAKER (Chairman)

PATTERSON FRENCH

JOHN H. THURSTON

CERTIFIED STATEMENTS OF ACCOMPLISHMENT IN PUBLIC
ADMINISTRATION

Certified Statements of Accomplishment are granted to undergraduate and to graduate students who have completed an organized course of study in public administration intended to provide basic training for responsible administrative work.

The programs leading to a Certified Statement of Accomplishment in Public Administration should be of special interest to:

1. Persons already employed in responsible administrative positions. Included in this group are many with specialized training who have been transferred to administrative positions from professional positions without training or previous experience in administration.
2. Junior Professional Assistants. Those who entered the service with a public administration option may profit from courses both more advanced and more specialized than those taken in college. Those who entered on various professional options and are now employed in such professions can profit very greatly from these courses if they expect, or wish to prepare, to enter into administrative work connected with their professional fields.
3. Employees who wish to broaden their understanding and improve their efficiency through a "tour of duty" by study, in lieu of an actual tour of duty for which they have found no opportunity.
4. Employees with college background who aspire to transfer to a career in administrative management.
5. Administrative assistants and administrative technicians of all kinds.

Approach

Broad-gauge, essentially long-range approach to develop leadership, perspective, broad outlook, and understanding of the human

factors in administration; emphasis on principles, with opportunity for study of some techniques in relation to policy.

Objectives

Ultimately, for policy formulation, improvement of administrative machinery, coordination of operations, and general management and control of large units. Immediately, for initial investigations as a junior member of a staff having the responsibilities named above, for assumption of increasingly difficult and more responsible assignments in these fields, and for supervision and management of small units.

Requirements

Requirements for Certified Statement of Accomplishment for Undergraduate Study in Public Administration:

1. Twenty-four semester hours of credit in college level courses in the social sciences. With the approval of the Registrar of the Graduate School, credit may be given for not more than six hours of other courses which are considered to be of value in connection with work in public administration (such as English literature, composition, philosophy, mathematics, or natural sciences). Introductory courses in the following must be taken:

American or European Government or Political Science
Economics
American or European History
Public Administration

Much importance is attached to the general background courses in the belief that they help to broaden the thinking and understanding of the student so that he will possess a wider range of ideas and interests and sounder judgment of social values than would otherwise be the case and, in consequence, will be able to render Government service of a higher level of value than he would if he did not have such basic training. For this reason, these requirements will not be waived.

2. Twenty-four semester hours of credit in undergraduate and graduate courses in public administration, excluding all accounting courses except Federal Government Accounting. The 24 credit hours are to be distributed as follows:
 - a. A minimum of six credits from the Division of General Administration.
 - b. The remaining eighteen credits may be selected from the

Divisions of Government-Legislative-Public Relationships, Organization and Methods Analysis, Financial and Budgetary Administration, Personnel Administration, Legal Administration, Procurement and Property Management, or additional general courses in public administration.

Upon prior approval by the Registrar, credit for courses outside the Department of Public Administration (including not more than two courses in office techniques and operations) may be applied when such courses are properly in line with the student's major interest.

Students seeking this statement should consult with and obtain approval of their proposed course of study, from the Registrar, early in their academic program.

Requirements for Certified Statement of Accomplishment for Graduate Study in Public Administration:

1. Bachelor's degree. This requirement will be waived only in very exceptional cases when the student can offer educational accomplishments substantially equivalent to a Bachelor's degree and when he has demonstrated by appropriate examination the breadth of knowledge equivalent to such a degree in the social sciences.
2. Twenty-seven semester hours of credit in advanced undergraduate and graduate courses in public administration, of which ten hours of credit shall be for courses numbered 600 and above, and excluding all accounting courses except Federal Government Accounting. The 27 credit hours are to be distributed as follows:
 - a. A minimum of eight credits from courses in the Division of General Administration.
 - b. Sixteen credits may be selected from the Divisions of Government-Legislative-Public Relationships, Organization and Methods Analysis, Financial and Budgetary Administration, Personnel Administration, Legal Administration, Procurement and Property Management, or additional general courses in public administration.
 - c. Three hours of credit for the course, Readings and Papers in Public Administration.

Upon prior approval by the Registrar, credit for courses outside the Department of Public Administration may be applied when such courses are properly in line with the student's major interest.

Students seeking this statement should consult with and obtain

approval, from the Registrar, of their proposed course of study early in their academic program.

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Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate (senior); above 699, graduate. Bracketed numbers, not given this year.

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BACKGROUND COURSES

341. American National Government

Fall, 2 credits. Repeated in Spring and Summer

CHARLES W. SMITH

History and origins of the national Government of the United States; the political process—parties and elections; the legislative process; the functions of the national Government and their administration; courts and judicial review of legislation. Students are advised to take this course before Introduction to Public Administration.

344. Introduction to Public Administration

Fall, 3 credits. Repeated in Spring and Summer

DAVID S. BROWN

This course is designed to introduce the student to the elements of public administration. Attention will be devoted to the evolution of administrative organization; organizational types: staff, line, and auxiliary agencies and functions; controls of administration; the broadest aspects of personnel selection, classification, training, movement, and relations; budgeting and fiscal control; federal-state relations; administrative legislation and adjudication. The object of the course is to lay a broad foundation for more intensive courses in management. *Prerequisite:* High school graduation or equivalent, or one course in the Clerical-Administrative Procedures Group, Department of Office Techniques and Operations. Desirable to have had American National Government.

570. Management Responsibilities for the Administrative Scientist

Fall, 2 credits

WILLIAM G. TORPEY

This course is designed to assist persons with backgrounds in scientific or professional fields to carry out effectively supervisory and administrative responsibilities. Techniques and methods will be discussed with respect to work planning, leadership, selecting personnel, organizing the staff, procuring equipment and supplies, budgeting available funds and employees' time, developing efficient work methods, directing and scheduling operations, coordinating effort, developing skills, maintaining high morale, and reporting results. *Prerequisite:* Bachelor's degree, supervisory experience or permission of the instructor.

Writing Procedures and Instructions

(See p. 52)

Philosophy—An Analysis of the American Tradition

(See p. 90)

DIVISION OF GENERAL ADMINISTRATION

450. Principles of Scientific Management

Fall, 3 credits

I. THOMAS MCKILLOP

Common functional elements of management. Definition of objective; organization; planning; coordination of execution through schedules, budgets, reports, and measurement of progress. Types of motivation. Historic management types. Types of organization. Personal relations and community relations in the several management types. Origin, nature and development of scientific management. Application of scientific management in enterprises outside of government. *Prerequisite:* Bachelor's degree; or a course in American government and a course in economics or another social science.

540. Application of Scientific Management in Public Enterprise

Spring, 3 credits

PHILIP C. WARD

The influence of underlying economic and social forces, operating within the structure and processes of a democracy, on organized conduct of public affairs. Major types of public agencies and basic differences between these types. Origin of purpose and policy in public enterprise. Comparison of public and private enterprise as to motivation, objectives, purposes and establishment. Criteria of the quality of public administration. Application of the principles of scientific management in public enterprise including a study of the similarities and contrasts between public and private enterprise. *Prerequisite:* Principles of Scientific Management or equivalent.

545. Top Executive Leadership in Public Administration

Spring, 3 credits

JOHN J. CORSON

The importance at all levels of administration of the quality of top control. The major problems of the chief administrator. Establishment of major and of component objectives, policies, and programs. Development of effective public relations, personnel and financial management.

Establishment of controls that result in adequate progress toward established standards, goals, and other objectives. Selection of controls and reporting systems. The budget as an instrument of control. *Prerequisite:* Principles of Scientific Management or equivalent.

550. Internal Organization Patterns, Relationships and Procedures of Public Agencies; the Function of Supervision

Spring, 3 credits

PERRY R. TAYLOR

Detailed consideration of the relation of major subdivisions to top administration and to coordinate subdivisions. Problems of coordination in a decentralized organization geographically dispersed. Importance of clear definition of responsibilities and of vertical and horizontal relations.

The essence of supervision and of appropriate techniques. Coordination of activities, policies and objectives of component parts of an organization as an essential part of supervision. Establishment of standards and of procedures for measuring and appraising performance. Comparison throughout with corresponding responsibilities and procedures in private enterprise. Supervision as a problem of human relations. *Prerequisite:* Principles of Scientific Management or equivalent.

519. Work Standards and Work Measurement

Spring, 2 credits

I. THOMAS MCKILLOP and WILFRED S. WILLIAMS

A study of the most advanced techniques of scientific management concerned with development of work standards and measurement of work loads and per-

formance, and of their adaptability in public administration. Statistical and experimental methods of determining standards. Dangers to avoid in setting standards. Time study. Standards as a dynamic part of operations, and a tool in developing policies on personnel placement and training. Standards as aids in developing budgets, in planning operations, and in individual work planning. Importance of dependable standards, measurement and appraisal of performance to summary statements of progress for the use of higher administrative officials. *Prerequisite:* Practical working experience at Grade CAF-7 or above, or permission of instructors.

600. Readings and Papers in Public Administration

Fall, 3 credits. Repeated in Spring

JOHN H. THURSTON, Coordinator

Under the guidance of a senior administrative official, supervised readings with monthly conferences on specified topics of administration or individual research and a paper on some problem or phase of administration. Readings or problem to be investigated are determined in consultation with adviser. *Prerequisite:* Approval of the Registrar; completion of 12 hours of course work in public administration, including Introduction to Public Administration, with at least a B average. This requirement may be waived in the case of persons at grade CAF-9 or above who are engaged in administrative work.

DIVISION OF GOVERNMENT-LEGISLATIVE-PUBLIC RELATIONSHIPS

COMMITTEE ON GOVERNMENT-PUBLIC RELATIONSHIPS

R. LYLE WEBSTER (Chairman)

TRIS COFFIN

CLYDE HALL

OMER W. HERRMANN

ARTHUR ORR

MORSE SALISBURY

LYLE F. WATTS

400. Administrative Operations for Congressional Assistants

Spring, 2 credits

EVA B. ADAMS

This course deals with the practical administrative problems encountered by secretaries and other staff assistants to U. S. Senators and Congressmen. Such matters as the following will be considered: organizing the office routines; handling veterans' affairs; relations with the executive departments; the practical workings of Congress and assistance with legislative matters; pressure groups; relations with constituents; political organization and campaigns. Enrollment limited to employees of the Legislative Branch, except by consent of instructor.

515. The Legislative Process

Fall, 2 credits

GEORGE B. GALLOWAY

Information about the legislative process which will tend to facilitate effective cooperation between the personnel of the Legislative and Executive Branches. The functions of Congress; organization of Congress; consideration of bills in committees; consideration of bills on the floor; party leadership in Congress; the functions of the Executive regarding legislation; assistance by executive agencies in the legislative process; relation of non-governmental groups to legislation; legislative staff aids; congressional investigations of executive agencies as a control mechanism; correspondence, informational, and informal relations between Congress and executive agencies.

To give vitality and practical value to the subject, basic orientation lectures will be supplemented by seminar sessions, visiting experts, visual aids and planned laboratory techniques designed to provide active student participation in Congressional processes.

710. Government Public Relations

Fall, 2 credits

R. LYLE WEBSTER and SPECIALISTS

An examination of public relations activities in Federal agencies today; Federal publications trends; field relationships; review of successful use of in-

formation media and group contact activity in Federal public relations; development of individual plans of work directed toward specific problems encountered by participants in their daily duties.

Designed to give information workers an overall picture of the scope of the public relations responsibilities of a Federal agency. Provides specialists in press, radio, visual, and other information media with an understanding of the total informational and public relations needs of an agency; prepares such specialists for broader responsibilities. Useful, also, to administrative and scientific workers who look forward to executive positions, in giving an appreciation of the public relations responsibilities of administrators. *Prerequisite:* Limited to persons in the Federal information field and to persons with or preparing for broad responsibilities in scientific or administrative work.

DIVISION OF ORGANIZATION AND METHODS ANALYSIS

COMMITTEE ON ORGANIZATION AND METHODS ANALYSIS

HAROLD A. STONE (Chairman)

NORMAN G. ASBURY

N. ROBERT BEAR

HARVEY E. BECKNELL

WILLIAM R. DIVINE

STANLEY T. GORDON

THOMAS J. HICKEY

FREDERICK MOSHER

ORLANDO A. SIMMES

555. Principles and Techniques of O&M Work

Year, 2 credits each semester

DAVID D. LEVINE and JOHN D. YOUNG

Deals with the principles and techniques employed in surveying and analyzing organization and methods problems and in formulating solutions for such problems. Emphasizes: planning and conducting various types of surveys; organizing and presenting survey facts; forms analysis; establishing effective relationships; the human element in O&M work; ways of dividing work and controlling work flow; presenting recommendations; installing new methods; follow-up. *Prerequisite:* Applicants will file at the time of registration a statement of their reasons for taking the course. Preference will be given to those engaged in O&M work; registration will be accepted from those not now engaged in O&M work and such persons will be admitted insofar as facilities permit.

780. Establishing and Administering O&M Work

Fall, 2 credits

HAROLD A. STONE and JOHNSTON E. LUTON

Deals with the problems of establishing and administering O&M work. Planning and conducting surveys; controlling survey operations; selecting staff; selling recommendations; establishing an O&M unit; responsibilities and authorities of an O&M unit; relationships within and without a bureau, department, and the Government; scope of O&M work; pitfalls to be avoided; control and management of administrative issuances and related topics. Emphasis is placed upon different sets of circumstances encountered in O&M work. Cases are presented both by the students and the instructors. This course is designed for persons who wish to expand their knowledge of the *administrative phases* of O&M work. It is essential therefore that they have previous education or experience or both in the practical application of its techniques. *Prerequisite:* Completion of courses in O&M techniques in a recognized school and consent of instructor, through Graduate School office.

DIVISION OF FINANCIAL AND BUDGETARY ADMINISTRATION

[525.] Financial Organization and Procedures of the Federal Government

CARL W. TILLER

635. Budgetary and Financial Administration: Budget Formulation

Fall, 2 credits

RALPH S. ROBERTS and STAFF

First part of an advanced, two-semester program for experienced budget-staff personnel. Covers the broad phases of budgetary and financial administration in the Federal Government primarily from the standpoint of the operating department.

The course deals with the pre-appropriation phases of budgeting, including formulation, review, and congressional enactment of the budget. Topics discussed include: the role of budgeting in program formulation; the role of bureaus, departments, Bureau of the Budget, the President and Congress in budgeting; content of the budget and of departmental estimates and related budgetary materials; the investment and capital-outlay budgets; review and analysis of budget estimates; budget justification; legislative-administrative relationships in budgeting. *Prerequisite:* Bachelor's degree and an introductory course in public administration; or experience at a responsible level in budgetary, financial or general administration; or consent of instructor.

636. Budgetary and Financial Administration: Budget Execution

Spring, 2 credits

RALPH S. ROBERTS and STAFF

This is the second part of an advanced two-semester course covering the broad phases of budgetary and financial administration in the Federal Government. Several officials from bureau and department budget offices and other budgetary and financial organizations lecture and lead discussions.

This semester deals with the execution of the budget after it is enacted by Congress and the relationships of administrative planning and control, accounting, auditing, and financial reporting to budget execution. *Prerequisite:* Bachelor's degree and an introductory course in public administration; or experience at a responsible level in budgetary, financial or general administration; or consent of instructor.

DIVISION OF PERSONNEL ADMINISTRATION

COMMITTEE ON PERSONNEL ADMINISTRATION

H. DEAN COCHRAN (Chairman)

JAMES L. BUCKLEY

VIRGIL L. COUCH

WILLIAM F. HOWELL

HAROLD LEICH

ARTHUR B. MCLEAN

RICHARD O. NIEHOFF

ROSS POLLOCK

O. GLENN STAHL

JOSEPH E. WINSLOW

561. Public Personnel Administration

Fall, 2 credits. Repeated in Spring

O. GLENN STAHL

Designed for supervisors and administrators wishing to have general familiarity with personnel work, for those in junior personnel staff positions desiring a broad understanding of personnel administration, and for those desiring to enter the field who need a foundation for the more specialized courses in the personnel field. Personnel problems which arise when people are associated together in a work situation; basic personnel policies and practices necessary and useful in treating personnel problems; differences between responsibilities, with respect to personnel administration, of the supervisor and the personnel officer; the various phases of personnel work; study of merit system and forms of organization; civil service legislation at various governmental levels; relationships between the Civil Service Commission and operating agencies and personnel offices of latter; trends in public personnel administration and its relationship

to overall management. *Prerequisite:* One of the following: Introduction to Public Administration; Course 108 or 114 in the Department of Office Techniques and Operations; Grades CAF-4 or above in personnel work; 60 semester hours of college work.

530. Selection and Placement

Fall, 2 credits

ELINOR HAYES

Recruiting, evaluation, probation, placement, and promotion of employees, with special reference to the Federal civil service; lectures and discussions. *Prerequisite:* One of the following: Course 344 or 561 in Public Administration; Grade CAF-4 or above in personnel work; 60 semester hours of college work.

629. Tests and Measurements

Spring, 2 credits

HELEN R. HAGGERTY

Designed for students interested in the application of psychological tests, rating scales, interviews and other devices in modern personnel administration. Topics covered: the theory of measurement; reliability and validity of measuring devices; construction, use and interpretation of tests; types of aptitude, achievement and personality tests; and the use of rating scales and standardized interviews. *Prerequisite:* A course in general psychology and one in statistics, or the equivalent as approved by the instructor.

559. Position Classification I—Elementary

Fall, 2 credits. Repeated in Spring and Summer

WILLIAM C. LAXTON and JOSEPH P. FINDLAY

Covers the fundamental concept of position classification and its uses; the relation of classification to compensation and other phases of personnel. An analysis of the Classification Act of 1923 and its amendments. *Prerequisite:* One of the following: Courses 344 or 561 in Public Administration; Grade CAF-4 or above in personnel work; 60 semester hours of college work.

560. Position Classification II—Advanced

Fall, 2 credits. Repeated in Spring

WILLIAM C. LAXTON and JOSEPH P. FINDLAY

Covers methods of position classification; the application of position classification in the Federal Service, including operating policies, practices and procedures; and the analysis and application to specific positions of factors determining class and grade levels. *Prerequisite:* Position Classification I or experience in position classification subject to the approval of the instructor.

[720.] Seminar in Federal Position Classification (1950-51 and alternate years)

JAMES L. BUCKLEY

305. Fundamentals of Accident Prevention

Fall, 2 credits

ROBERT L. JENKINS

Designed for those in junior staff positions desiring a broad understanding of accident prevention, for those desiring to enter the field who need a foundation for the more specialized courses in accident prevention, and for supervisors and administrators wishing to have general familiarity with accident prevention work. Covers basic approaches to accident prevention; division of responsibilities; technical, economic and social aspects of the accident problem; organization and mechanics of an accident prevention program; and established techniques for reducing accidental wastes in all work programs.

633. Employee Relations and Employee Services

Fall, 2 credits

ASTRID W. KRAUS

This course defines the basic content of an employee relations program. Deals with the formulation of employee relationship policies; the development and application of grievance and other appeals procedures; the techniques for sharing information with employees, for handling employee discipline and for assisting supervisors to appraise and deal with employee problems; the provision of essential employee services, such as housing, child care, transportation, recreation, health and educational information, and so forth, necessary to recruit and maintain an adequate work force. Discussion will also be devoted to the relationship of Government as an employer to its employee groups; the history of union-management relationships in the Federal service; present day problems of affiliation, "collective bargaining" and areas of negotiation on policy formulation and settlement of employee grievances. *Prerequisite:* College degree or personnel work at Grade CAF-7 or above or consent of instructor.

[658.] Law of Federal Personnel Administration (1950-51 and alternate years)

RALPH F. KOEBEL and RAWLEIGH L. TREMAIN

842. Personnel Division Management

Fall, 2 credits

VIRGIL L. COUCH

Application of subject matter covered in Public Personnel Administration. Full instruction and guidance with reference to establishment and operation of the personnel activity of an agency. Problems of internal management in personnel offices and problems of personnel division organization; operating relationships between the personnel office and other staff and line organizations; means of coordinating the respective phases of personnel operations; budgeting and relative cost of a personnel program; how to influence supervisors and others who must carry the responsibility for supervision as a phase of personnel administration; how to make and issue personnel policy; how to plan personnel programs; how to use technicians, deputies and specialists; and types of organization for personnel administration, such as centralized and decentralized and combination types of organization structure. *Prerequisite:* A course in Public Personnel Administration or employment in personnel work at grade CAF-9 or above; or consent of instructor, such consent being based on a review of the training and experience of the applicants.

DIVISION OF LEGAL ADMINISTRATION

COMMITTEE ON LEGAL ADMINISTRATION

ASHLEY SELLERS (Chairman)

THOMAS J. FLAVIN

RALPH F. KOEBEL

DAVID REICH

320. Introduction to Administrative Law and Procedure

Fall, 2 credits

EDWARD C. JOHNSON

The increased complexity of modern society has meant that administrative agencies have played an expanding role in the regulation of life and property. This course studies the law which controls and the law which is made by governmental officers. Material used includes regulations, orders and decisions which will acquaint students with traditional and current developments in administrative law and procedure. Topics covered include: powers and duties of administrative authorities as they relate to private interests; means of enforcing decisions; remedies against official action; legal qualifications for office; legal disqualification of officers; appointment, tenure, removal and compensation of officers; and related matters.

[480.] Copyright Law (1950-51 and alternate years)

LOUIS C. SMITH

663. Legal Aspects of Investigation—Criminal Evidence and Procedure

Spring, 2 credits

RALPH F. KOEBEL

Designed to provide investigative personnel and those desiring to prepare for such work, a background and insight into the legal aspects of their investigations: what types of evidence to seek; circumstances and conditions under which the evidence is to be obtained in order to have adequate probative value; and how to prepare such evidence for presentation in court or other procedure. Since all investigations are potential sources of prosecution, the requirements of criminal evidence and procedure often reach into the early stages of investigation. The instruction is designed to provide understandable information without overemphasis of technical aspects.

[680.] Administrative Law

ASHLEY SELLERS

[820.] Seminar on Problems of Federal Administrative Regulation (1950-51 and alternate years)

THOMAS J. FLAVIN

Protecting Engineering and Scientific Developments Through Patents

(See p. 108)

Business Law

(See p. 77)

DIVISION OF PROCUREMENT AND PROPERTY MANAGEMENT**COMMITTEE ON PROCUREMENT AND PROPERTY MANAGEMENT**

JAMES SCAMMAHORN (Chairman)

WILLIAM E. FEE
CLIFTON E. MACK
CHARLES E. OFFUTT

S. A. SNYDER
FRANK H. SPENCER
RAY WARD

637. Management of Governmental Supply

Spring, 2 credits

JAMES SCAMMAHORN

An advanced course covering the broad phases of handling and managing Government supply activities. Especially useful to employees engaged in budget and personnel activities who need general knowledge of supply office functions. Deals with supply policies, organization and management, finances, and laws governing supply. Topics: (1) organization and management of purchasing offices; (2) organization and management of warehouses; (3) property accounting, management and distribution of supplies and equipment; (4) management and training of purchasing and warehousing personnel; (5) procurement function efficiency determination and importance of project service objective and its relation to good Government purchasing and warehousing; (6) decisions of the Comptroller General and regulations affecting procurement; (7) nature of public contracts as compared with private contracts; (8) Federal Specifications and specification studies, including development and writing; (9) delivery requirements, inspection of supplies and liquidated damages; (10) market analysis and conditions which affect seasonal project work of Government bureaus; (11) laws which affect procurement contracts such as Walsh-Healey Act, Davis-Bacon Act, Eight-Hour Law; (12) functions of General Accounting Office, Bureau of Federal

Supply, Federal Prisons Industries and surplus disposal agencies in the supply scheme; (13) traffic problems and transportation studies on methods of shipment; (14) new developments in procedures affecting supply and dissemination of information to field supply units. *Prerequisite:* One of the following: Introduction to Public Administration; Federal Purchasing Procedure; Federal Property Procedure; Grade CAF-4 or above in purchasing work; 60 semester hours of college work.

DIVISION OF ACCOUNTING

COMMITTEE ON COMMERCIAL AND GOVERNMENTAL ACCOUNTING

WILLIAM H. ROWE (Chairman)

PAUL L. APPELMAN

WARNER H. HORD

LAWRENCE O. MANLEY

CHARLES N. MASON

ROBERT W. MAXWELL

HERSCHEL C. WALLING

The Graduate School is interested in offering accounting courses primarily as a means of training for the *public* service.

The curriculum necessarily includes courses in general accounting because the basic principles are essential for Government accounting. The scope of accounting in the Federal service is wide. There are increasing demands for accountants having a knowledge of commercial as well as Government accounting. These demands have come as a result of the formation of many Government corporations and Federal regulatory agencies. Hence, the accounting program required for a Certified Statement of Accomplishment is broad enough to cover not only the regular appropriation accounting of the Federal Government, but also the accounting training needed for many other governmental activities. The program is comprehensive enough to meet both advanced training for the Government service, and also, if courses are carefully selected, the usual educational requirements for C.P.A. examinations. Students planning to take C.P.A. examinations should know the requirements of the state in which they plan to take the examination. In general, their study, in addition to accounting, should include the following: Principles of Economics, Corporation Finance, Investments, Mathematics of Finance, Business Law, Statistics, Business English, Principles of Marketing and Industrial Management.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN ACCOUNTING

Requirements

1. High school diploma or equivalent.
2. Thirty-six semester hours of credit in courses outlined below and distributed as follows:
 - a. All of the required courses.
 - b. No less than three semester hours credit from the Accounting Elective Courses.

- c. No less than six semester hours credit from the Related Elective Courses.
- d. The remaining six semester hours credit may be taken in either of the two elective groups.

REQUIRED COURSES

<i>Accounting</i>	<i>Number of Semesters</i>	<i>Semester Hours Credit</i>
Principles of Accounting	2	6
Intermediate Accounting	2	6
Cost Accounting	1	3
Auditing	2	4
Advanced Accounting Problems	1	3

ACCOUNTING ELECTIVE COURSES

Federal Government Accounting	1	3
Federal Tax Accounting	1	3
Analysis and Interpretation of Financial Statements	1	2
Mathematics of Finance	1	3
Federal Accounting Procedure	1	3
Federal Auditing Procedure	1	2
or Advanced Federal Auditing Procedure	1	2
Budgetary and Financial Administration	2	4
Advanced Accounting Problems (Second Semester) .	1	3
Accounting Systems	1	2
Cost Accounting (Second Semester)	1	3

RELATED ELECTIVE COURSES

Business Law	2	4
Principles of Economics	2	6
Principles of Statistical Analysis	2	6
Writing Procedures and Instructions	1	2
or Introduction to Official Writing	1	2

352^a. Principles of Accounting—First Half

Fall, 3 credits. Repeated in Spring and Summer

HERBERT G. MARSHALL
WILLIAM H. ROWE

Elementary principles of accounting; discussion and problems. At the end of the semester students will be prepared to do the accounting necessary for a small business organization; i.e., keep a complete set of books, draw up statements at the end of the fiscal period, adjust the accounts for accruals, deferred items, depreciation, etc., and close the books. *Prerequisite:* High school graduation or equivalent.

352^b. Principles of Accounting—Second Half

Fall, 3 credits. Repeated in Spring and Summer

RULON GIBB
HERBERT G. MARSHALL
WILLIAM H. ROWE

Continuation of first half covering more advanced principles of accounting; accounting for partnerships, corporations and manufacturing; depreciation policies and analysis of financial statements. *Prerequisite:* First half or equivalent.

353^a. Intermediate Accounting—First Half

Fall, 3 credits

WARNER H. HORD

Advanced principles of manufacturing accounting, corporation accounting, and valuation as applied to current assets, fixed assets, intangibles, and liabilities, reserves and funds, installment sales. *Prerequisite:* A first year course in accounting.

353^b. Intermediate Accounting—Second Half

Spring, 3 credits

WARNER H. HORD

Advanced principles of partnership accounting, including formation, operation, and dissolution; joint ventures; consignments; agencies and branches; consolidated balance sheets and income statements; application of funds; accounting for insolvent and bankrupt concerns; estates and trusts. *Prerequisite:* First half or equivalent.

422. Business Law

Year, 2 credits each semester *

ELMER MOSTOW

Aspects of law essential to the conduct of modern business. Forms of business organization, bailments, property, sales, mortgages, negotiable instruments, contracts. *Prerequisite:* Principles of Economics, Intermediate Accounting or equivalent.

[423.] Mathematics of Finance

RALPH R. BOTTS

354. Federal Government Accounting

Fall, 3 credits. Repeated in Spring

CHARLES N. MASON

A review of the development of the accounting system for Federal funds and the present financial organization in which the accounting is performed with attention to the accounting responsibilities of each segment of the organization, including the Treasury Department and the General Accounting Office. Detailed study is given to the accounting problems of administrative agencies with special emphasis on general ledger controls and financial reporting problems. *Prerequisite:* One year of Principles of Accounting, or Federal Accounting Procedure and one semester of Principles of Accounting or equivalent.

**[510.] Analysis and Interpretation of Financial Statements
(1950-51 and alternate years)**

LAURENCE W. ACKER

642. Cost Accounting

Year, 3 credits each semester (alternate years)

ALFRED D'ALESSANDRO

A thorough and comprehensive treatment of the principles of cost accounting, together with the methods of their application to specific problems. By means of lectures, textbook study, and problems, full consideration is given to the methods of cost accounting for materials, labor, direct and indirect expenses in their relationship to specific job orders; process, departmental and standard costs; and the control accounts. *Prerequisite:* Principles of Accounting.

645. Federal Tax Accounting

Fall, 3 credits

EUGENE C. MOYER

Federal taxation presented from the accounting viewpoint. Special attention given to income taxation. *Prerequisite:* Principles of Accounting; accounting experience desirable.

* This course is so arranged that students may attend both semesters or either semester. No subject matter, however, will be repeated.

[693.] Auditing (1950-51 and alternate years)

JOHN C. COOPER

646. Advanced Accounting Problems

Year, 3 credits each semester (alternate years)

LAURENCE W. ACKER

This course is intended primarily to furnish a coverage of miscellaneous accounting problems for general review and partially to serve as C.P.A. examination review. It will include financial statements, municipal (fund) accounting, corporation accounting, partnership accounting; consolidation intercompany accounting; company accounting; accounting theory and other processes of accounting. In the second semester emphasis is placed on such subjects as accounting systems, and accounting for management purposes. Principal emphasis in the course will be placed on the working of problems at home and in class. Class discussion of these problems will be held, and loose leaf solutions will be distributed after the problems have been worked and discussed. Supplemental reading on the subject matter of the problems will be done by the student for his own benefit and at his own option. *Prerequisite:* Three years' accounting training. With instructor's permission, however, the course may be taken concurrently with third year accounting.

[695.] Accounting Systems (1950-51 and alternate years)

LAURENCE W. ACKER

Department of Social Sciences

DEPARTMENTAL COMMITTEE

SHERMAN E. JOHNSON (Chairman)

ROGER B. CORBETT
FOSTER F. ELLIOTT
H. DUNCAN HALL
HAROLD B. ROWE

CARL C. TAYLOR
J. MURRAY THOMPSON (Vice-chairman)
HARRY C. TRELOGAN
FREDERICK V. WAUGH

PURPOSE AND SCOPE

Social science deals with people and the problems of human relationships, as contrasted with natural or physical science which deals with things and the problems arising out of physical relationships.

The problems of social organization and operation have become both absolutely and relatively more important with the increase in complexity of our industrial civilization. More and more, people are concerned with the organization of production, the distribution of goods and income, and with price policies. The individual as a consumer and investor, the businessman and the farmer as producers, find increasing need for a knowledge of economics and other social sciences. Large corporations are employing growing numbers of economists to help in the formulation of policy. Psychologists and social workers are finding a demand for their services in personnel work. And, the large number of Federal, state and local government agencies need more people adequately trained in social science.

Social science is divided into a number of closely allied fields including economics, sociology, political science, history, law, and psychology. A broad grasp of any one of these subjects implies at least some familiarity with the others, because of the many interrelationships among these studies. Yet the continued development of each social science has given rise to larger and still larger bodies of knowledge relating to it, until only through a considerable degree of specialization can the student hope to master any one part. Thus the great need is for people who have concentrated sufficiently on one phase of a social science, such as marketing in economics, to be thoroughly familiar with the details of fact and principles involved, yet who also have a broad underlying training in the allied fields.

The courses offered by the Graduate School are designed to aid in acquiring a general background in the social sciences, as well as the specialized training in particular fields which is necessary for successful work in many Government departments and in private

business. Some courses are included that are of interest outside of a person's field of work or specialization. For example, the course, Introduction to the Study of Human Relations, is of interest to all persons who desire a better understanding of human behavior as a basis for their day to day contacts with other people. A course in Managing Personal Finances will be useful to persons who are faced with problems of owning a home, investing current savings, or making decisions with respect to the type of life insurance best suited to their special needs.

But not all of those engaged in occupations connected with the social sciences can hope to attain a complete general as well as specialized background, at least for some time to come. They will be interested, rather, in courses designed to fit them better for doing some specific job which is not connected with research, policy formation or general administration. An employee in the personnel office of a Department of Agriculture branch responsible for market news and inspection services may wish to take a course in marketing in order to learn something about the subject matter dealt with by the personnel of the branch, or a course in psychology as an aid in dealing with the personal problems which are daily presented to employee counselors. The secretary to an economic research director may want a course in the principles of economics in order to become familiar with the terminology and general economic concepts to which her stenographic and filing duties relate. An almost unending array of job needs of this kind offers opportunities to the alert and ambitious employee to increase his capacity and usefulness to his employer. The many promotions within the Government service which can be traced directly to such training testify to the fact that study in the social sciences is profitable.

GROWING NEED FOR TRAINED WORKERS

It is extremely important that Government policies, relating to the economic and social life of the Nation, be based on competent studies of the probable effects of alternative lines of action. To forecast accurately what will happen and to point out clearly the good and bad effects which may result from any proposed course of action is the major service which social scientists may render to the people of this country.

Washington is an excellent place to study problems of this kind. The principal Federal programs in the economic and social fields are administered in Washington and new proposals constantly are being considered both by the Congress and by the agencies responsible for the administration of those programs. Moreover, Washington is growing in importance as a center for the discussion and actual administration of international programs.

SUGGESTIONS FOR PROGRAM OF STUDY

To meet the specific needs of students who have different educational and experience backgrounds and different immediate interests, the Graduate School has developed the following types of courses in the social sciences:

- (1) *Courses of General Interest.* Several of the social science courses are designed to provide information of general interest to a large group of persons who desire to broaden their background along certain lines. Some of these courses have been developed to meet the needs of persons who do not expect to become specialists in a particular field, but who desire to obtain some background in a subject, as a basis for work in related fields, or purely as a personal interest. The courses that meet the general interest needs of students are usually not of graduate level.
- (2) *Undergraduate Basic Courses.* These courses are designed to provide a basic social science background for students who have not completed their undergraduate training or who have not had an opportunity to take the basic background work in economics and the other social sciences as a part of their qualification for Bachelor's degree work. These courses provide an opportunity for persons who enter the Government service in the lower grades to prepare themselves for professional advancement.
- (3) *Graduate and Advanced Undergraduate Courses.* These courses offer work of graduate level but they are also open to undergraduates of advanced standing. Students who are registered for graduate credit will be expected to do more work in these courses than those who register for undergraduate credit.
- (4) *Strictly Graduate Courses.* These courses are offered only for graduate students who have adequate background. They are usually conducted on a seminar basis and they require a great deal of participation and preparation of material by the students themselves.

The Graduate School does not offer either undergraduate or advanced degrees, but it is possible for a student who is interested in working toward a degree to organize his work in the Graduate School in such a way that he will fulfill some of the requirements of the institution where he expects to obtain a degree. If possible, the course of study should be outlined in consultation with advisers at the institution where the student expects to take his degree. Stu-

dents who have not decided on the institution where they expect to complete their work but who wish to specialize in economics or in one of the other social sciences should select basic courses leading toward degree work, in consultation with designated advisers of the Graduate School.

Basic Undergraduate Courses for a Major in Economics. Students working toward a Bachelor's degree with specialization in economics should plan to complete the following courses either in the Graduate School or at some other institution:

- | | |
|---------------------------------------|----------------------|
| 1. Principles of Economics | 3. Economic History |
| 2. Principles of Statistical Analysis | 4. Money and Banking |
| 5. Public Finance | |

In addition to these courses, the students looking forward to concentration of work in agricultural economics should plan to complete undergraduate courses in Economics of Marketing and Economics of Farm Production. An elementary course in accounting should also be included if the student plans to major in prices and marketing. Undergraduate students who expect to major in one of the other social sciences should consult designated advisers in the Graduate School.

Graduate Courses. Students working for graduate degrees should consult educational advisers in the institution where they expect to receive their degree. If they have not selected such an institution they should confer with advisers in the Graduate School who are teaching in the particular field in which they expect to concentrate. In general, students who wish to map out a course of study leading toward a graduate degree should plan their work to include:

- (1) Completion of basic undergraduate courses.
- (2) Advanced courses in social science fields related to the particular field of concentration. For example, a student majoring in economics should consider advanced courses in statistics, economic history, sociology or some other related field in order to broaden his educational background.
- (3) Advanced courses in the field of concentration. Students who expect to major in one of the social science fields should begin their graduate work by taking the basic graduate courses in that special field. For example, students who expect to major in any field of economics should plan to take at least six credits of work in advanced economic theory and six credits in monetary and cycle theories. With these

courses as a foundation, the student can begin to specialize in courses in his particular field of concentration.

—O—

Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate (senior); above 699, graduate. Bracketed numbers, not given this year.

—O—

GENERAL ECONOMICS

COMMITTEE ON GENERAL ECONOMICS

BUSHROD W. ALLIN (Chairman)

JAMES P. CAVIN
MORDECAI EZEKIEL

HOWARD L. PARSONS
HOWARD S. PIQUET

Adequate foundation training in general economics is essential for satisfactory accomplishment in the study of any specialized branch of the subject. Hence, the primary objective in developing the following list of courses has been that of providing the basic work needed, by students who wish to carry out a systematic plan of study, at both undergraduate and graduate levels. In addition, a course on research methods is listed under this head. It is of general interest to students majoring in economics.

110. Introductory Survey of Economics

Summer, 2 credits

BUSHROD W. ALLIN

A refresher course for those for whom a lapse of time has intervened since taking a more complete course in principles and who wish to review the basic principles. Also for those interested in becoming acquainted with the nature and general content of economics as a science and a profession.

200. Introduction to Economics, Theory and Institutions

Fall, 2 credits

BUSHROD W. ALLIN

This course is largely a study of the place of collective action in economic theory. Institutions are defined as collective action in control of individual action. These take the forms of corporations, trade unions, farm organizations and decisions of the Supreme Court. Theory is interpreted as referring to mental tools useful for understanding and dealing with contemporary economic and social problems.

201. Principles of Economics

Year, 3 credits each semester

ROY J. BURROUGHS

An introductory course designed to equip the student with the basic tools of economic analysis and with an understanding of the more important institutions of the economic system including the individual business firm and the banking system. Economic problems are approached from two points of view: (1) the neo-classical, involving operations of the price mechanism, behavior of

individual consumers, business firms and industries and the interrelations within the economy including the allocation of resources and the distribution of the total product to the factors of production; (2) the modern "aggregative" approach emphasizing total effective demand and such general concepts as total employment, national income and wealth, and savings and investments.

[418.] Public Finance and Taxation (1950-51 and alternate years)

TYLER F. HAYGOOD

424. State and Local Government Finances

Fall, 3 credits (alternate years)

JOSEF BEROLZHEIMER

An extensive survey of the variety of financial problems confronting the non-federal levels of government. State and local government revenue, expenditure and debt, analyzed with regard to their financial structure and functional characteristics. Important problems of intergovernmental financial relations, such as federal aid to states, tax sharing, block grants, special purpose aid, etc. Impact of state and local finances on the national economy. *Prerequisite:* General background in economics, or experience in problems of public finance, as approved by instructor.

[480.] Money and Banking (1950-51 and alternate years)

ALLAN G. B. FISHER and JOHN K. HORSEFIELD

610. Advanced Economic Analysis

Fall, 3 credits

HOWARD L. PARSONS

Deals intensively with economic theory as a tool of analysis for problems of production, consumption, the market, and the aggregate economy. Analytical models, such as the firm, the industry, the household, and Keynes' General Theory, form the core of the discussions.

The specific focus of the course is on the ways of thinking and factors considered by individuals and group in the economy as they choose among alternative economic actions. As a part of these considerations, special attention is given to understanding the effect of particular institutions, such as different forms of government, price control, production control, etc., on these choices. *Prerequisite:* A course in principles of economics.

705. History of Economic Thought

Fall, 3 credits (alternate years)

MAX J. WASSERMAN

The economic theories of the most important schools and economists from Greek antiquity through Alfred Marshall (1895). The schools covered are the Greek, Medieval Period, Mercantilism, Physiocrats, the Classical School, Socialism of 1848, Historical School, Psychological School and the Neo-Classical School. The theories studied are projected against the factual and philosophical background of the period. *Prerequisite:* Principles of Economics or equivalent.

741. Modern Economic Thought

Year, 3 credits each semester

BUSHROD W. ALLIN and JAMES P. CAVIN

Develops the major lines of contemporary economic thought: first, in relation to the contributions of the leading economic theorists of the past 50 years, and second, in relation to each other. Designed to provide students with perspective and with an understanding of how fields of economic analysis currently receiving most attention are related to each other, rather than to provide intensive work on specialized theoretical techniques.

Includes a restatement of the neoclassical theories, particularly those of Alfred Marshall, and an examination of the relationship of the Keynesian system and the theory of imperfect competition to the Marshallian system, together with consideration of major critics of the general neoclassical approach, including Veblen, Commons, J. M. Clark, and Means.

As a survey of contemporary economic thought and analysis, attention is given to such fields as demand theory, equilibrium of the firm, employment theory and business cycles, monetary theory, national income analysis, economics of labor, economics of large-scale enterprise, international trade, and the theory of economic development. Those interested in intensive study of economic theory, however, will not find this course a substitute for Advanced Economic Analysis. *Prerequisite:* Principles of Economics or equivalent.

728. Seminar in International Financial and Trade Policies

Spring, 2 credits (alternate years)

OSCAR ZAGLITS

Discussions, with particular attention to postwar developments, of policies in the fields of (a) international trade (especially the General Agreement on Tariffs and Trade and the Charter of an International Trade Organization), (b) international finance (including direct United States lending and Export-Import Bank activities) and (c) foreign reconstruction and development (including Economic Cooperation Administration programs and the new program for assistance in development of underdeveloped areas).

Attention is given to financial policies of the United States as they relate to operations of international economic organizations such as the Economic and Social Council of the United Nations, United Nations Food and Agriculture Organization, International Monetary Fund, International Bank for Reconstruction and Development, and international commodity councils. Guest speakers will participate. *Prerequisite:* Graduate training or equivalent experience as approved by instructor.

712. Research Methods in Social Sciences

Spring, 2 credits (alternate years)

O. C. STINE and SPECIALISTS

This seminar considers scientific methods appropriate for the social sciences, with special attention to economics, then considers application of scientific methods to research in marketing, with some special attention to pricing and price level. *Prerequisite:* Training equivalent to that required for a Bachelor's degree, including basic elementary training in statistics and economics.

AGRICULTURAL ECONOMICS

COMMITTEE ON AGRICULTURAL ECONOMICS

BENNETT S. WHITE (Chairman)

PHILLIP F. AYLESWORTH
IRWIN R. HEDGES
R. W. JONES

HORACE R. JOSEPHSON
HAROLD B. ROWE
ROBERT M. WALSH

The great importance of enlarging and improving knowledge of the economics of agriculture is generally recognized. Constructive accomplishment in this field requires thorough training in economics combined with a comprehensive grasp of its application to the special conditions of agriculture. Such a balanced combination can best be achieved by following a systematic course of study appropriate to the particular area of concentration desired. The courses offered by the Graduate School permit students to carry out such plans of study with concentration in the economics of agricultural production, agricultural finance, prices, and marketing. The electives and general interest courses provided also permit the adaptation of study plans to meet the special interests of individual students.

Shortage of well-trained marketing personnel, at both Federal and State levels, critically handicaps developing a well-rounded program under the Agricultural Research and Marketing Act. The greatest immediate need is for men with advanced training who can undertake independent work in new fields. The broad expansion of activities scheduled under the Act also will continue and intensify the need for adequately prepared college graduates. On both problems the Department of Agriculture is cooperating closely with land-grant institutions. Joint committees have analyzed and mapped out attack on these problems. As part of this plan the Graduate School has given special advanced training to Washington personnel engaged in marketing work, and this year provides its full complement of regular courses in this field.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN AGRICULTURAL ECONOMICS

The Graduate School offers a Certified Statement of Accomplishment to students who have completed 30 credits of graduate work in agricultural economics, including the basic graduate courses in economics. To qualify, it is necessary to follow the specific sequence of courses that are listed for three fields of concentration indicated below.

The Certified Statement of Accomplishment is not an advanced degree, but it constitutes evidence of completion of an organized course of study in the field of agricultural economics. It is a certification that the student has completed a program of study which prepares him for effective public service in agricultural economics work. The Graduate School plans to extend the granting of Certified Statements of Accomplishment to other social science fields as there is sufficient demand.

COURSES LEADING TO CERTIFIED STATEMENT OF ACCOMPLISHMENT IN AGRICULTURAL ECONOMICS

(With Concentration in Specified Fields of Application)

Economics of Production

Agricultural Finance

Prices and Marketing

BASIC UNDERGRADUATE COURSES

Required foundation courses. Carry undergraduate credit only and may not be used to meet the credit hour requirement for the certified statement. Equivalent courses will be accepted by transcript from other institutions.

The number in parenthesis after course title indicates semester hour credits.

Principles of Economics (6)	Principles of Economics (6)	Principles of Economics (6)
Principles of Statistical Analysis (6)	Principles of Statistical Analysis (6)	Principles of Statistical Analysis (6)
Economics of Farm Production (3)	Economics of Farm Production (3)	Economics of Farm Production (3)
Introduction to Marketing (3)	Introduction to Marketing (3)	Introduction to Marketing (3)

REQUIRED BASIC GRADUATE COURSES

Advanced Economic Theory (6)	Advanced Economic Theory (6)	Advanced Economic Theory (6)
Money and Banking (4)	Money and Banking (4)	Money and Banking (4)

REQUIRED SPECIALIZED GRADUATE COURSES

Farm Management (2)	Agricultural Finance (3)	Economics of Marketing (4)
or		
Land Economics (4)		
Seminar on Agricultural Policies (2)	Farm Management (2)	
	or	
	Land Economics (4)	
Seminar in Economics of Production (3)	Seminar in Agricultural Finance (3)	Seminar on Agricultural Policies (2)
		Seminar in Marketing (3)

ELECTIVE GRADUATE COURSES

Select courses in consultation with Graduate School advisers to complete the 30 graduate credits required for certified statement of accomplishment.

[205.] Introduction to Farming

HARRISON M. DIXON and STAFF

[207.] Economics of Farm Production (1950-51 and alternate years)

KENNETH L. BACHMAN

[409.] Farm Management (1950-51 and alternate years)

WYLIE D. GOODSSELL

410. Land Economics

Year, 2 credits each semester (alternate years)

V. WEBSTER JOHNSON

A survey of economic principles governing utilization of major land types, including an appraisal of present land resources and future need for various types of land and land uses; traditional practices and customs that affect land use; private and public land ownership and tenancy relationships; problems of new settlement; land income under different conditions of ownership and management; and various state and local measures for the direction and control of land use and occupancy. *Prerequisite:* Principles of Economics and experience as approved by instructor.

411. Agricultural Finance

Fall, 3 credits (alternate years)

DONALD C. HORTON

Influence of the economic characteristics of different types of farms on their capital requirements; sources of agricultural capital—operator, landlord, and creditor investment; complementary and competitive relationships among farm credit institutions and other sources of agricultural capital; problems of institutions extending credit to agriculture; application of general principles of financial management to the farm business. *Prerequisite:* Economics of Farm Production or a course in Money and Banking.

412. Risk and Insurance

Spring, 3 credits (alternate years)

E. LLOYD BARBER, DONALD C. HORTON, and RALPH R. BOTTS

Review of the economic theory of risk with particular consideration to the risk problems encountered in farm production; analysis of present methods of risk-bearing, including several types of public and private insurance; appraisal of suggested methods of covering the economic risks encountered in farming. *Prerequisite:* Economics of Farm Production, or equivalent.

475. World Agriculture

Fall, 4 credits R. G. HAINSWORTH, CLARENCE M. PURVES, CLAYTON E. WHIPPLE

A survey of world agriculture including: (1) world agricultural geography, studying the influence of climate, soil and topography, density and distribution of population with the aid of illustrative material; (2) problems of collection and analysis of statistics on world production, trade and consumption of principal crop and livestock enterprises; (3) an analysis of how countries of strategic importance including France, Germany, Italy, and the Soviet Union, China, India, Japan, Australia, Argentina, Brazil and Canada have adapted their agriculture to climatic and economic conditions. *Prerequisite:* Background work in agricultural economics or equivalent.

[719.] Seminar in Resource Utilization and Conservation (1950-51 and alternate years)

V. WEBSTER JOHNSON and HORACE R. JOSEPHSON

[720.] Seminar in Economics of Production (1950-51 and alternate years)

SHERMAN E. JOHNSON and ASSOCIATES

721. Seminar in Agricultural Finance

Spring, 3 credits (alternate years) NORMAN J. WALL and RUSSELL C. ENGBERG

A seminar dealing with the policies, programs and functions of private, quasi-public and public credit agencies; appraisal how adequately credit needs are being met; new developments in financing agricultural production and marketing. *Prerequisite:* Background of graduate work and approval of instructor.

203. Introduction to Marketing

Fall, 3 credits (alternate years)

BENNETT S. WHITE

A preliminary course intended to provide orientation for the study of marketing as (1) a type of production which supplies essential services, and (2) a valuation process in which the prices of agricultural commodities are established. Marketing machinery costs, functions, methods and practices are surveyed. Marketing specialists of the Department of Agriculture will lead discussions relating to particular commodities and special problems. *Prerequisite:* Principles of Economics or the equivalent.

[414.] Economics of Marketing (1950-51 and alternate years)

H. M. SOUTHWORTH and HARRY C. TRELOGAN

[530.] Methods of Price Analysis (1950-51 and alternate years)

RICHARD O. BEEN and ROBERT M. WALSH

Statistical Analysis of Economic Relationships (See p. 44)

722. Seminar in Marketing

Spring, 2 credits (alternate years) FREDERICK V. WAUGH and WILLIAM C. CROW

A seminar for advanced students professionally interested in the organization of markets and market agencies (firms) in relation to adequacy of service, efficiency and costs. Chief emphasis will be placed upon application of analytical methods of economics, accounting and statistics to important problems and policy questions in this field. Credit will be awarded on the basis of papers submitted on the special subjects approved at time of registration. *Prerequisite:* Registration upon instructor's approval of topic selected by the student for special study.

[750.] Seminar on Prices (1950-51 and alternate years)

ORIS V. WELLS

407. History of Agricultural Policy in the United States

Year, 2 credits each semester

EVERETT E. EDWARDS

An introductory historical survey of agricultural policies from the first settlements to recent times; the principal forces shaping agricultural policies in past periods; the interrelationships of agricultural policies and contemporaneous economic and social theories and policies. Course method dependent on membership; may be given as a reading course.

416. Agricultural Cooperation

Spring, 3 credits (alternate years)

HAROLD HEDGES and A. REX JOHNSON

Discussion of the philosophy and economic concepts of the farmer cooperative movement; a review of its history and developments; analysis of legal phases and of organizational and financial structures; evaluation of major cooperative developments in the fields of marketing, purchasing and farm services; and appraisal of its future role in American agriculture. *Prerequisite:* Introduction to Marketing or equivalent.

Fall

1949

LECTURES ON
U. S. AGRICULTURAL POLICIES AND PROGRAMS

History and Development of Agricultural Policy **Production Adjustments**

Long Range Agricultural Outlook **Marketing**

Price Policy and Income **Farm People and Living Standards**

Conservation and Land Use

No registration required; no fees charged. Lectures will be given at 4:00 P.M. in the Jefferson Memorial Auditorium. A special announcement of each lecture in this series will be made to employees in the Department of Agriculture. While these lectures are designed primarily for this group, others interested in special topics are invited.

Committee

W. A. MINOR, Chairman

C. R. ARNOLD

ORIS V. WELLS

PHILLIP F. AYLESWORTH

FRANK K. WOOLLEY

716. Seminar on U. S. Agricultural Policies and Programs

Fall, 2 credits (alternate years)

W. A. MINOR, C. R. ARNOLD,

PHILLIP F. AYLESWORTH, FRANK K. WOOLLEY and ORIS V. WELLS

Thorough, practical analysis and evaluation of the major components of current agricultural policies and programs. Speakers in the lecture series and officials of concerned agencies of the Department conduct informal discussions of the forces in the development of policy and explore the operation of programs as to their effectiveness in remedying the problems to which they are directed. An objective appraisal is made of policies adopted and operation of programs during previous years. *Prerequisite:* Limited to persons carrying broad staff or operational responsibility in an agricultural program or related activity; or to persons with an advanced degree in agriculture or a related field plus experience as approved by the seminar's executive officer, Mr. Aylesworth.

HUMAN RELATIONS**COMMITTEE ON HUMAN RELATIONS**

CARL C. TAYLOR (Chairman)

FORREST E. CLEMENTS

T. WILSON LONGMORE

DOUGLAS ENSMINGER

IRENE B. TAEUBER

Courses in this division are listed in the order of their levels, beginning with the general introductory and orientation course and going to the more advanced and more specialized courses. Students are encouraged to select courses suited to their needs and academic backgrounds in this field. During the registration period members of the faculty or of the committee which planned these courses will be available for consultation.

105. Introduction to the Study of Human Relations

Fall, 2 credits. Repeated in Spring and Summer

T. WILSON LONGMORE

A study of the contributions of the various social sciences, but especially sociology, psychology and anthropology, to an understanding of human behavior. An integrative course for students who have not had an opportunity to study any of the sociological sciences. Designed to acquaint students with techniques and principles used in describing and analyzing human relations. Should not be taken by students academically prepared to do advanced work in this field.

210. General Psychology

Fall, 3 credits

GLEN FINCH

A study of the basic patterns of human behavior, instincts, habits, ideas and attitudes. The course begins with a thoroughgoing analysis of the human nervous system and concludes with an analysis of personality.

215. General Sociology

Fall, 3 credits

ARTHUR F. RAPER

A basic and general study of social problems and processes with special emphasis upon such problems as population, race, poverty, crime, divorce, etc., and group processes such as organization, leadership, public opinion, etc.

306. Philosophy—An Analysis of The American Tradition

Spring, 3 credits

JOHN M. BREWSTER

An analysis of basic ideas in the American Tradition in terms of the circumstances of their origins and their role in shaping public policy. Consideration of such ideas as: sanctity of property rights and human rights; belief in

family responsibility for its own welfare security; resource-population ratio as the basis of American optimism; belief that each succeeds according to his merits; and the role of government in reconciling liberty and equality. Viewpoints of various representative Americans are used to illustrate the development and application of these ideas.

470. Introduction to General Semantics

Fall, 2 credits. Repeated in Spring

J. A. SAUNDERS

A study of this new methodology, the application of the investigative methods of the physical sciences, through extensional devices and techniques based on mathematical theory, to the social sciences, particularly individual and group relationships. Discussion of Korzybski's theories of human agreement, human progress, sanity and happiness. Applications of general semantics to case situations.

40. General Semantics Workshop

Year, non-credit

J. A. SAUNDERS

Limited to 20 Students

For persons wishing to continue their study of general semantics and extensional methods of evaluation, particularly as focused on case situations. The workshop will include: practical exercises in applying principles of general semantics to everyday personal and professional problems; information exchange on practical applications made by participants; study of practical applications made by other groups and individuals; laboratory training in applying extension techniques to change our "minds," to keep concepts current, and to employ democratic procedures and extensional evaluation methods in reaching agreements. *Prerequisite:* Introduction to General Semantics or equivalent or approval of instructor.

308. Introduction to Cultural Anthropology

Fall, 3 credits

FORREST E. CLEMENTS

The origins of human culture, its historical development, language and culture, culture processes and principles of culture change. Stresses psychological factors in the acquisition and perpetuation of culture and analyzes human behavior as a resultant of innate and culturally acquired traits.

310. Farm Labor and Tenure Problems

Spring, 2 credits (alternate years) LOUIS J. DUCOFF and MARSHALL D. HARRIS

Survey of the comparative social and economic conditions of farm laborers, sharecroppers, tenants and owner-operators, and their roles in American agriculture. Farm labor problems reviewed against a historical background of agricultural employment and wage conditions. Farm tenure problems considered in terms of insecurity of tenure, absence of legal safeguards, low incomes, and the functioning of "the agricultural ladder." Possible measures for amelioration of farm labor and tenure problems.

315. Population

Fall, 3 credits

IRENE B. TAEUBER and MARGARET J. HAGOOD

A study of the historic growth and distribution of the world's population; balance of births and deaths in various societies in relation to social, economic and resource factors; levels and differences in mortality, fertility and migration with emphasis on the United States. Considerable attention given to population prospects and problems in the United States and in other countries.

421. Rural Sociology

Spring, 3 credits

T. WILSON LONGMORE

The application of modern sociological methods to the study of rural life. A generalized course covering the whole field of rural sociology, but a specialized

sociological course in the sense that it deals altogether with the rural society, rural institutions, rural social organization, rural cultural differences and cultural variations in American rural life. *Prerequisite:* A college course in the social sciences.

433. Social Psychology

Spring, 3 credits

DOUGLAS ENSMINGER

A general course on the social aspects of personality, social interaction and collective behavior. It includes treatments of cultural conditioning of personality, personality measurement, communication, public opinion, propaganda, censorship, mobs, riots, and social movements. An individual project is required for the third credit. *Prerequisite:* A course in general psychology or equivalent.

[437.] Contemporary Cultures (1950-51 and alternate years)

EDWARD A. KENNARD

[439.] Urban Sociology (1950-51 and alternate years)

ARTHUR F. RAPER

446. The Labor Force in the United States

Fall, 3 credits

LOUIS J. DUCOFF

A study of the level, composition and change in the labor force; the demographic, socio-economic factors, bringing about change in the labor force; the rural-urban differential in these factors; problems of measurement of employment and unemployment levels and the interpretation of such statistics; the agricultural and other occupation composition and shifts in the Nation's labor force. Problems of geographic and occupational labor mobility in the light of factors facilitating or impeding mobility. *Prerequisite:* Approval of instructor.

500. Child and Adolescent Psychology

Spring, 2 credits (alternate years)

LILY BRUNSCHWIG

Designed for those who want to understand the growth and development of children. Covers the period from infancy through adolescence and studies the physical, mental, and emotional development of the child. Includes discussion of the process of physical and mental growth and resulting physical, social and emotional changes with particular reference to the period of puberty. *Prerequisite:* A course in psychology.

[503.] The Conditions of Personality Growth (1950-51 and alternate years)

CLIFFORD P. FROELICH

[504.] Personality Disorders (1950-51 and alternate years)

ALBERT C. CORNSWEET

511. Population Research Methods and Analyses

Spring, 3 credits (alternate years)

MARGARET J. HAGOOD

Methods of computing basic demographic rates, including standardized birth and death rates and measures of mortality and fertility based on life tables, migration rates, labor force participation rates; methods of analysis of composition characteristics of populations and dynamics of population in relation to other factors; methods of making future population and labor force projections; methods of developing adjustments for non-comparability, incompleteness or other inadequacies of population data, and of computing approximate or substitute rates. *Prerequisite:* Population or equivalent.

Point 4 and Contemporary National Cultures

LECTURES AND SEMINARS

Fall and Spring

1949-50

A lecture and seminar series designed to define different national cultures and to determine how such basic knowledge regarding them can be used to promote the development of cooperation between and among nations. The series will be especially oriented to the "Point 4 Program" for economic development of undeveloped areas. It will have equal significance for all other channels through which we have international and intercultural differences.

The lectures will be given by distinguished and experienced persons from the fields of international relations, cultural anthropology, social and clinical psychology, philosophies of history and progress, and international public administration. These lecturers will be drawn from among the Federal service, colleges and universities, and international foundations and organizations. A special announcement will be issued indicating topics, lecturers and dates. The lectures will be given at 4:30 P.M. in Jefferson Memorial Auditorium and are open to persons in Agriculture and elsewhere whose work relates to the topics.

The seminars will be limited to persons involved in program planning, policy making and administration of governmental and private programs in international and intercultural fields. Some of the seminars will be devoted to discussions led by the lecturers. Other seminars will use the case method in analysis and discussion of current problems of administration and program planning in the intercultural fields. Under the leadership of Chairman Wilson, the seminars will meet on the mornings following the lectures. Seminar attendance will be by invitation.

Neither registration nor fees is required for lectures or seminars.

Committee

M. L. WILSON, Chairman

FOSTER F. ELLIOTT, Vice-chairman

Mr. Wilson and Mr. Elliott will be assisted by a sponsoring and advisory committee of representatives from concerned Government departments and agencies and from other organizations.

[512.] **Demographic Research: Substantive** (1950-51 and alternate years)

IRENE B. TAEUBER

515. Sociology and Psychology of Group and Community Relations

Fall, 3 credits

DOUGLAS ENSMINGER and CARL C. TAYLOR

A study of community organization and action, of group processes and functions, with special reference to problems which confront agricultural extension workers, health, welfare and church leaders, and general farm organizations; a study of leadership as a function of group formation and action, with special reference to group dynamics. *Prerequisite:* Approval of instructor.

516. The Cultural Regions of the United States

Spring, 3 credits

CARL C. TAYLOR and ARTHUR F. RAPER

A study of the cultural regions of the United States, covering in detail the characteristics of the various regions and subregions and their interrelationships, including settlement patterns, social organizations and institutions, prevailing ideologies, mores and folkways, and dominant attitudes and opinions of the people who live in the rural areas of these cultural regions. *Prerequisite:* Two courses in the social sciences.

[718.] **Seminar in Rural Social Problems and Policies** (1950-51 and alternate years)

Staff of the Division of Farm Population and Rural Life (BAE)

COOPERATIVE EXTENSION EDUCATION

COMMITTEE ON COOPERATIVE EXTENSION EDUCATION

CANNON C. HEARNE (Chairman)

ARTHUR L. DEERING
DOUGLAS ENSMINGER

GLADYS G. GALLUP
MEREDITH C. WILSON

Cooperative extension education consists of the off-campus, non-resident teaching service of the land-grant institutions in cooperation with the USDA and the leadership of a county. It is the largest non-school educational program in the United States. The growing interest on the part of county agents, supervisors, specialists, and administrators in cooperative extension work as a profession has led the Graduate School to appoint a committee on Cooperative Extension Education. This committee has the responsibility for giving guidance to students toward a program best suited to the individual's needs, within the framework of the Graduate School. This program may well lead to an advanced degree depending upon the plans of the student and the cooperative arrangements available through the Graduate School. A separate leaflet is available describing the courses listed below, which will be given as the demand justifies, and showing also a general framework of courses of interest to cooperative extension people.

450. Methods and Techniques

2 credits

GLADYS G. GALLUP and OTHERS

451. Extension Education for Foreign Students

3 credits

FREDERICK P. FRUTCHEY

596. Development of Programs

2 credits

CANNON C. HEARNE

535. Basic Evaluation, Research Methods and Techniques

2 credits

LAUREL K. SABROSKY, FREDERICK P. FRUTCHEY and OTHERS

620. Administration and Supervision

2 credits

M. C. WILSON

695. Problems in Cooperative Extension Education

6 credits

CANNON C. HEARNE

CONSUMPTION ECONOMICS

Consumption economics is concerned with the interrelationships of production and distribution of income with the kind and quantity of consumption goods and their distribution. Special attention is given to conditions that maximize consumer knowledge and freedom of choice and to factors affecting the distribution of consumption goods, especially income and savings and their distribution, place of residence and type of consuming unit and additional factors such as price advertising, standardization and informative labels. Customs, legislation and social organization of various types, and their effect on consumption, receive special attention.

325. Managing Personal Finances

Fall, 2 credits

HARALD C. LARSEN, assisted by

RALPH R. BOTTS and RALPH F. KOEBEL

Renting versus owning a home; costs of home ownership; methods and mathematics of financing; characteristics of deed, abstract, mortgage, trust, contract, and notes; financing durable and other consumer goods; sources and costs of consumption credit and installment buying; characteristics of major types of investments, stocks, bonds, debentures, mortgages, notes, savings accounts, and property; provisions for retirement, Federal retirement system and options, social security and other retirement systems. Insurance: choosing a company, features of principal life insurance and annuity contracts, protection versus savings, nonforfeiture privileges, settlement options, and property, liability and other insurance programing. Planning and administration of estates, joint ownership, laws of intestacy, making a will, administration of estates as executor or administrator, proof of will, costs and fees.

[419.] Standards of Living

ISABELLE M. KELLEY

[521.] Economics of Food

GERTRUDE S. WEISS

445. Consumer Cooperation

Fall, 2 credits

VALERY J. TERESHTENKO

The role of consumer cooperation in the social and economic life of Europe, Latin America and the United States. Beginning with a brief review of the theory of cooperation, emphasis will be placed on its application in the fields of credit, housing, health, education, etc. Consumer cooperation in Sweden, Switzerland, and Great Britain, credit cooperatives in Germany and India, group health associations in Poland and Yugoslavia and the industrial cooperatives in China will be studied. Emphasis is on cooperatives in countries of primary importance to the United States in this post-war period, and on social implications of consumer cooperation in the post-war economy.

447. Housing and Farm Structures

Fall, 2 credits (alternate years)

ROY J. BURROUGHS

Economics, finance and public policy with particular emphasis on farm housing. Provides background for Department of Agriculture employees with responsibility or interest in the operating, research, and policy problems posed by new legislation on farm housing and farm structures. Illustrative of subject matter are: economic and social functions of farm housing with urban comparisons, defining standards, expenditure patterns, financial organization, and legal instruments used in housing finance, analysis of need and prospective markets, critique of existing institutional and legal arrangements for financing and supplying construction activity on the farm. Lectures by instructor and others, library readings, and term report. *Prerequisite:* Principles of Economics or consent of instructor.

HEALTH AND MEDICAL SERVICES

COMMITTEE ON HEALTH AND MEDICAL SERVICES

RAYMOND C. SMITH (Chairman)

ELIN ANDERSON

NELSON H. CRUIKSHANK

FRANZ GOLDMANN, M.D.

MELVIN T. JOHNSON, M.D.

MARGARET C. KLEM

T. WILSON LONGMORE

MILTON I. ROEMER, M.D.

MARIE E. WALLACE

The wide-spread interest in improving the organization and administration of health and medical services is well illustrated by the growth of prepayment plans for medical care, such as those in industry and those sponsored by consumer and professional groups, and by active discussion of proposals for a comprehensive national health service. Developments such as these have focused attention on the need, in areas both of governmental and voluntary activity, for greater emphasis on exchange and dissemination of information and experience among those in this field, and for equipping personnel now in or preparing to enter this work with information and techniques essential to effective operation. The courses listed below reflect, along one line, the efforts of the committee listed above to make such provision for personnel in both governmental and voluntary agencies in the Washington area. It is also anticipated that experience and materials developed through this program will be of considerable value to other institutions interested in providing such educational opportunities.

460. Introduction to Medical Economics

Fall, 2 credits

MARGARET C. KLEM and SPECIALISTS

A review of the economic status of the population; indications of unmet needs for health services: death rates, prevalence and duration of illness, results of physical examinations in selected population groups, receipt of medical care, comparison of care received with estimates of adequacy, expenditures for medical care including a summary of the outlays by government, industry, philanthropy and consumers and the uneven burden of consumer medical costs; distribution of health personnel and facilities and incomes of hospitals and health personnel; utilization of health facilities; various insurance programs for hospital and medical service; summary of public opinion and proposals for improving distribution of medical care. *Prerequisite:* Elementary courses in social science, or equivalent experience as approved by instructor.

540. Health Service Programs

Spring, 2 credits (alternate years)

MARGARET C. KLEM, ELIN ANDERSON and SPECIALISTS

A study of existing medical care programs supported by approximately 2 billion dollars a year from local, State and Federal taxation; including medical care programs of the Veterans Administration, departments of public health and public welfare, and such special programs as cancer, heart, tuberculosis, mental health, and maternal and child health. *Prerequisite:* Introduction to Medical Economics, or equivalent in education and experience as approved by instructors.

[770.] Seminar on Health Service Policies and Programs (1950-51 and alternate years)

MARGARET C. KLEM and MILTON TERRIS, M.D.

PUBLIC HEALTH NURSING

To provide increased educational opportunities for nursing personnel employed in Federal Agencies, the School of Nursing Education of the Catholic University of America and the Graduate School of the Department of Agriculture cooperatively offer courses in public health nursing. Each semester those courses will be offered in which a sufficient number of employed nursing personnel having the necessary prerequisites indicate interest. Complete information on courses offered will be available in the Graduate School office or may be had from the Catholic University of America, School of Nursing Education.

These courses carry resident credit at the Catholic University of America and are those offered in the program approved by the National Organization for Public Health Nursing. These courses, and others which are taken at the Graduate School of the Department of Agriculture and are the equivalent of required academic courses at the School of Nursing Education, may be offered in partial satisfaction of requirements toward a Bachelor of Science degree at the Catholic University of America.

It is recommended that students interested in the nursing field take English, Psychology and Sociology in addition to their professional courses.

INTERNATIONAL RELATIONS

COMMITTEE ON INTERNATIONAL POLICIES AND PROBLEMS

H. DUNCAN HALL (Chairman)

JORGE BASADRE

STANLEY K. HORNBECK

NELSON T. JOHNSON

WALTER KOTSCHNIG

HAROLD LASSWELL

GEORGE L. RIDGEWAY

LEWIS H. ROHRBAUGH

FRED J. ROSSITER

CLAYTON E. WHIPPLE

FRANCIS O. WILCOX

For the official in most spheres of government, as well as for the private citizen, some familiarity with the wide range of international relations has become essential to efficient living and work. The human and technical forces involved and the problems they create are so complex that they cannot be understood without special study.

Life for modern man in its main aspects is a coin with two faces, one national, the other international. He has to know both faces. This applies almost as much to production, trade and finance, to communications, science and culture, as it does to "defense" and "foreign policy."

The fact that the main activities of life are parts of a world-wide complex of relationships is above all true for the great powers whose political, economic and cultural lives are lived out willy-nilly in the main stream of world history. The extent of their power and interests gives their peoples special opportunities in the world at large and these carry responsibilities no less wide. At the same time under modern conditions of mechanized power and mass communications the physical and mental frontiers and the interior, even of a great power, are more open to attack than at any time in past history.

Public lectures and courses in this field are designed to give the student some opportunity for: (1) training in methods of approach to international relations; (2) insight into some of the basic causal factors that determine the main trends of international relations; (3) a deeper knowledge of some of the main and more complex problems of the world today; and (4) some familiarity with the impact of such problems on particular regions or countries, and the part they play in international affairs.

525. The Application of Psychoanalytic Theory and Methods to Problems of International Relations

Fall, 3 credits (alternate years)

H. M. SPITZER

Although based primarily on the study of the individual, the discoveries of psychoanalysis can be used to gain a better understanding of group relations.

The methods and the theories which can be used for this purpose form the subject of this course. The first few lectures are devoted to methods of psychoanalytic research and are combined with simple exercises. They are followed by an examination of the social situation in which the individual develops, and

Fall

1949

LECTURES ON
THE UNITED STATES AND WORLD AFFAIRS

Oct. 6—The Oil of the Middle East—Its Economic and Political Significance

HERBERT FEIS

Nov. 17—Indonesia and the Netherlands

N. A. C. SLOTEMAKER DE BRUINE

Oct. 20—The Economic Rehabilitation of Greece

GEORGE C. MCGHEE

Dec. 1—The Philippines

EMILIO ABELLO

Nov. 3—Southeast Asia and Rice

N. G. ABHYANKAR

Dec. 15—Nationalism and Development in the Arab World

GEORGE V. ALLEN

These lectures will be given at 6:00 P.M. in Jefferson Memorial Auditorium. No registration required; no fees charged. Open to employees and the general public.

Co-chairmen

NELSON TRUSLER JOHNSON

WILLIAM VAN ROYEN

of its effects on individual and national character. A discussion of the effects of national character on the relations between nations, especially in their irrational aspects, forms the final part of the course. Detailed syllabus available on request. *Prerequisite:* Major in psychology or history or equivalent experience approved by instructor.

820. Seminar in American Foreign Relations, Policies and Practices

Spring, 3 credits

NELSON TRUSLER JOHNSON

Fundamental principles as developed in the conduct of our foreign relations from the Declaration of Independence up to the close of the free immigration period in 1925; significant subsequent developments through and following World War II, requiring us to accept and meet the responsibilities which go with our position among the nations.

United States Government organization for conducting its business with other governments. Factors which have played major roles in the development of foreign policy: commerce, international finance, shipping, fishing, agriculture, etc.; public opinion and the influence of media of mass communication; minority

and pressure groups; etc. Implementation of foreign policy in peace and war, choice of people and machinery; informing other peoples about ourselves and how best to accomplish it. Need for effective coordination of our governmental machinery so as to identify and harmonize the needs and convictions of the whole American people in a united common action for the achievement of their ideals. Present methods of coordination. Other possible methods, including the Secretariat system. *Prerequisite:* Graduate study in the social sciences, or responsible administrative or supervisory experience, or approval of instructor.

428. Current Problems of World Politics

Summer, 2 credits

PETER BERGER

Structure of state system; nationality; sovereignty as the maximum area of agreement. "We the peoples of the United Nations." Conditions of peace and causes of war (conflicts of will, interests and ideas; desires for things incompatible with peace; political, economic and ideological aggressions; insecurity, etc.). State and private struggle for power on the economic plane. Raw materials, population, agriculture and food. Diplomacy; military organization; ideological manipulations (political and psychological warfare by use of channels of communications, such as speech, press, radio, etc.); attempts to maintain peace

Spring

1950

LECTURES ON NATIONAL AND INTERNATIONAL POLICIES AFFECTING AGRICULTURE

**Agricultural Policies in
the British Empire**

A. N. DUCKHAM

**FAO's Interest in World
Food and Agricultural
Policies**

NORRIS E. DODD

**ECA Influence on Ag-
ricultural Policies in
Western European
Countries**

D. A. FITZGERALD

**U. S. Agriculture in the
World Ahead**

ALBERT J. LOVELAND

These lectures will be given at 4:00 P.M. in Jefferson Memorial Auditorium. No registration required; no fees charged. Open to employees and the general public. A special announcement, giving lecture dates, will be made later.

Committee

ALBERT J. LOVELAND, Chairman
A. N. DUCKHAM

FRED J. ROSSITER

and reasons for failure. Facilitating international cooperation, political, economic, cultural; and mitigating conflict by means of international institutions, public and private.

434. Basic Factors in the Relations Between States

Spring, 2 credits

H. M. SPITZER

Political thinking is apt to operate with concepts that are two or three generations out of date. In the study of international relations the state is treated usually as a rather constant and unvarying basic concept. In reality its character has changed greatly and continues to change.

This course discusses some of these changes, their causes and the ways in which they have created new international problems and modified old ones. Among the factors discussed are: growth of national civil services; effects of medical science on the size and quality of populations and on the suitability of regions for human settlement; changing influence of physical and mental diseases; effects of the spread of popular education; changing character and importance of public opinion; intensification of human contacts; greater speed and volume of communications; and influence of fashion, and the repercussions of modern technology. *Prerequisite:* Training in one of the social sciences or equivalent experience approved by instructor.

745. The United Nations: Organization and Functions in Relation to American Policies

Spring, 3 credits (alternate years)

HOWARD B. CALDERWOOD

A course especially designed to give government officials a broad and intimate view of the intermeshing of American policies, interests and machinery of government with the many sided machinery of the new world organization. In analyzing the main features of that organization and its functioning, the course will aid in the understanding of the international side of the work of the various agencies of the United States Government. *Prerequisite:* An undergraduate degree in one of the social sciences, or responsible administrative or supervisory experience, or approval of instructor.

[816.] World Communications and Transport (1950—51 and alternate years)

WILLIAM VAN ROYEN and SPECIAL LECTURERS

[817.] The Policies and Inter-Relations of the Great Powers—U.S.A., British Commonwealth and U.S.S.R. (1950—51 and alternate years)

H. DUNCAN HALL and OTHERS

430. Modern Russia

Fall, 2 credits

VALERY J. TERESHTENKO

Beginning with a brief summary of political, social and cultural life in Imperial Russia, the major emphasis will be on Russia since the Revolution: Soviet geography, ethnography and psychological characteristics of the Soviet people. Organization of the Soviet State and government; the Soviet Constitution. The Five-Year Plans. The agricultural, industrial, and banking systems. Trade, cooperatives, trade unions, social insurance. The Soviet educational system, art, music, the theatre, and ballet. Turning points in the Soviet history since 1917. International relations; USSR and the United States.

440. Problems of the Balkans and Middle East

Spring, 3 credits (alternate years)

CLAYTON E. WHIPPLE and ASSOCIATES

The political and socio-economic problems of the region and its component nations; review and analysis of the problems and their background, and of solu-

tions put forward. Special emphasis on rural and agricultural problems, including the current United States programs in Greece and Turkey.

Lectures and discussions on special problems will be presented by outstanding authorities on the region. A complete list of visiting lecturers and topics will be issued in January, 1950.

443. Contemporary Far East—Southeast Asia

Fall, 3 credits (alternate years)

CLARENCE HENDERSHOT

An introduction to the complex problems of South-East Asia. Analysis of current political and economic aspects against an historical background, with special reference to the impact on the peoples of the area of the two great Asiatic neighbors—China and India. Special attention given to American interests. *Prerequisite:* Undergraduate work in the social sciences, or equivalent as approved by instructor.

TRANSPORTATION AND COMMUNICATIONS

COMMITTEE ON TRANSPORTATION AND COMMUNICATIONS

DONALD E. CHURCH (Chairman)

RUSSELL B. ADAMS
WILLIAM C. CROW
FORD EDWARDS

WALTER B. EMERY
MYLES E. ROBINSON
FREDERICK L. THOMSEN

J. C. WINTER

The economic and social life of nations is directly affected by the availability, cost and quality of transportation and communications service. Transportation service is not only important to individual enterprises as a link in the process of obtaining supplies and reaching markets, but the type of economic activity of an area is dependent upon transportation. For example, specialized production areas and large markets could not exist without transportation. As an industry, transportation ranks among the largest in the nation; about 60 billion dollars are invested in transportation plant and equipment and over two million persons are employed by the industry.

The public interest in transportation is so vital that, about sixty years ago, railroad transportation was put under government regulation which has more recently been extended to motor, air and water carriers. The extent of regulation differs among the types of carriers and among the various state and federal agencies having regulatory responsibilities. Regulatory policies not only affect transportation agencies themselves but also create far-reaching influences throughout the economic system. Similarly, public interest has necessitated extensive control in the field of communications.

The courses offered in this field are designed to meet the specific needs of several types of students. Survey of Transportation is offered for persons working in other fields who wish to obtain a general understanding of transportation, and for persons who need a background for advanced work in this field. Regulation of Communications is a similar course in its field.

Two courses will be useful to persons who need a better understanding of transportation rates and efficient traffic management from the shipper point of view. For persons primarily interested in rates and rate structures, Transportation Rates and Rate Determination is suggested; while Traffic Management is recommended for persons who are primarily interested in the general phases of traffic management. Commercial Air Transportation is offered for persons who wish to obtain a comprehensive knowledge of this rapidly expanding industry. Transportation Research—Materials and Techniques is offered for persons who are engaged in transportation research or must rely upon findings made by others. It stresses ways to determine what information is available, interpretation, and guide-posts to detect and minimize misinterpretation.

Current Economic Problems in Transportation deals intensively with a few of the more pressing problems, and appraises the relative merits of various possible means to remedy them. This course is aimed to meet the needs of persons who have had extensive training or experience in economic analysis and who have a general knowledge of transportation.

345. Survey of Transportation

Fall, 2 credits

DONALD E. CHURCH

A survey of transportation, types of carriers, and regulatory agencies. Deals briefly with the historical development of transportation and the relationship between transportation rates and the location of production and marketing centers; emphasis is placed upon regulatory policies and practices of the various agencies, cost and service characteristics of the various forms of transportation, establishment of rates and rate levels, and inter-carrier competition.

461. Transportation Rates and Rate Determination

Fall, 2 credits

ABBEFORD S. DOLCH

The course is designed to give the basis for a general understanding of the use of traffic documents, commodity classifications, tariffs and traffic publications for the several forms of transportation, and a knowledge of rate principles and history of major rate adjustments.

462. Traffic Management

Spring, 2 credits

JAMES F. PERRIN

Designed to acquaint transportation students with the principles and practices of traffic management from both Governmental and commercial points of view. Emphasis on functions of a traffic department, both industrial and Governmental, and on relations between carriers and traffic departments, with a considerable portion of the emphasis placed on transportation law. *Prerequisite:* Transportation Rates, or experience with rates and tariffs, or permission of instructor.

[438.] Commercial Air Transportation (1950–51 and alternate years)

MYLES E. ROBINSON

510. Transportation Research—Materials and Techniques

Spring, 2 credits

DONALD E. CHURCH

Designed primarily as a practical course for persons engaged in transportation research or using the findings of such research in connection with other activities; stress is placed upon the nature of research materials available and the analysis and interpretation of such materials. Among major phases are: (a) general principles involved in preliminary analysis of research problems as basis for selecting research materials; (b) use of reference guides and other devices to locate material; (c) analysis and interpretation of major transportation statistics and customary terminology; (d) ways to detect and avoid errors of interpretation; (e) selected methods for estimating factors not directly shown by existing information; (f) analysis and presentation of specific findings. *Prerequisite:* Knowledge of transportation and statistics, or permission of instructor.

[605.] Communications in Society

WALTER B. EMERY

641. Current Economic Problems in Transportation

Fall, 2 credits

FRANK L. BARTON and SPECIALISTS

The most important current economic problems are reviewed briefly to obtain a general understanding of the present situation; a limited number of problems are selected for intensive analysis. Each student selects or is assigned a special problem or phase of a broad problem for careful analysis. In general, the issues and proposed solutions for a selected pressing problem will be presented by one or more specialists drawn from carrier or shipper organizations, Government agencies, practitioners or others directly interested in the specific problem. Following the presentation of the various points of view, roundtable discussions will be held to appraise the issues and solutions. *Prerequisite:* Advanced study in transportation or responsible employment in related fields.

Department of Technology

DEPARTMENTAL COMMITTEE

F. J. SETTE (Chairman)

THOMAS B. CHAMBERS (Vice-chairman)
R. G. HAINSWORTH
H. E. HILTS
DANIEL KLATZKO

E. J. STOCKING
GILBERT S. UNDERWOOD
E. J. UTZ
MARSHALL S. WRIGHT



For more than ten years, the various departments and agencies of the Federal Government have been engaged in extensive programs of conserving natural resources and raising the standards of living and welfare in urban and rural areas. These programs have been translated into specific projects involving flood control, soil conservation, power development, rural electrification, industrial hygiene, housing and a number of related activities. All these governmental actions have involved in varying degrees engineering techniques and engineering personnel.

Basically, education in engineering schools, limited by necessity and tradition to a period of four years, is mainly technical. In this short period, barely sufficient to assimilate and master a minimum of the basic sciences, there is little room for courses to supply the engineering student with background in the social and economic world about him so that he may understand the impact of the advances of his profession upon society. Moreover, developments in the sciences and in engineering require enlarging of the engineer's technical background.

Mindful of these limitations of engineering education and of the engineer's place in modern society, the Graduate School, working together with representatives of the various Government departments and of the local chapters of engineering societies, offers courses intended to add to the technical, administrative and professional background of engineers in the service of the Federal Government.

The Department of Technology also offers a number of courses in those skills basic to engineering operations which will be of assistance to the engineer, the applied scientist and the non-engineer desiring to broaden his background.



Course Numbers and Symbols—Below 100, non-credit; 100–399, undergraduate; 400–699, graduate and advanced undergraduate

(senior); above 699, graduate. Bracketed numbers, not given this year.

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DIVISION OF ENGINEERING

COMMITTEE ON ENGINEERING

THOMAS B. CHAMBERS (Chairman)

C. L. BUSH
J. A. C. CALLAN
J. H. GEHRING
FERDINAND KAUFHOLZ

HARRY SAWCHUCK
J. P. SCHAEZNER
F. F. SNYDER
E. J. UTZ

475. Naval Architecture

Year, 2 credits each semester (alternate years)

CHARLES L. WRIGHT

First semester: Determination of principal dimensions of a ship; development of ship lines; displacement and stability calculations; launching.

Second semester: Trochoidal wave theory; action of ships in waves; hull form and resistance; power; propulsion, steering.

Prerequisite: Completion of junior year in a school of engineering or equivalent experience.

[476.] Ship Construction (1950-51 and alternate years)

CHARLES L. WRIGHT

[402.] Principles and Practice of Refrigeration (1950-51 and alternate years)

HARRY L. GARVER

[403.] Principles of Air Conditioning (1950-51 and alternate years)

RICHARD S. DILL

501. Transmission and Distribution Systems for Area Electrification

Fall, 3 credits

EDWARD P. EARDLEY

Study of electrical and mechanical characteristics of lines used in the transmission and distribution of power; the operation of such systems; the economic principles on which design rests. *Prerequisite:* Degree in engineering or equivalent experience.

702. Electric Utility Engineering

Year, 2 credits each semester (alternate years)

J. J. A. JESSEL

Fundamentals of electric utility engineering and their practical application to generating, transmitting, and distributing electric energy by electric utilities. Designed for engineers, engineering aids, lawyers, accountants and others who desire a broader understanding of the basic principles of electric utility engineering as applied to operating electric utilities. Subjects covered are: a general description of production, transmission, and distribution plants of electric utility, including each of the units of the property and an explanation of its functions; lectures and case studies in design and operation of electric generating stations, transmission lines and substations, and distribution substations, feeders, transformers, and services; discussions of practices followed by electric utilities in serving different classes of customers. *Prerequisite:* College degree or equivalent experience.

510. Analysis of Statically Indeterminate Structures

Year, 2 credits each semester (alternate years)

ALFRED W. FISCHER

The first semester covers the review of the fundamental slope deflection equations and the moment distribution method. Subjects will include: rectangular frames; complex three column bent and Vierendeel truss with parallel top and bottom chords by the superposition method; general equation of flexural stress; an asymmetrical section unsymmetrically loaded; miscellaneous problems; review.

The second semester covers the column analogy method and the fundamentals of least work. Subjects will include: simple bents; unsymmetrical arch; fixed end moments; stiffness factor, carry over factors, and fixed end moments for an unsymmetrical curved member with varying moment of inertia; secondary stresses; miscellaneous problems; review. *Prerequisite:* Degree in civil engineering or equivalent.

520. Theory and Design of Welded Structures

Spring, 2 credits (alternate years)

NATHAN W. MORGAN

Topics to be treated: fundamentals of metallurgy; weldability and processes generally applicable to the welding of ferrous metals; basic symbols, definitions and specifications; a study of welding training, qualification, inspection and safety rules; a summary of recent tests of welded specimens, static, inspect, and fatigue; a survey of welding difficulties and failures; welded structures and experiences; and actual design problems and details. One or more recent films will be shown. *Prerequisite:* College degree in engineering or equivalent experience, including a general knowledge of the computation of stresses in structures.

[542.] Mechanical Vibrations (1950-51 and alternate years)

ALBERT LONDON

[700.] Analysis of Rigid Frames (1950-51 and alternate years)

A. AMIRIKIAN

310. Aerodynamics

Year, 2 credits each semester

MAURICE E. LONG

First semester: Fluid flow, wing theory, airfoil characteristics, wind-tunnel tests, stability, drag data. Lectures, discussions, and problems.

Second semester: Engine and propeller considerations, performance calculations, special problems. *Prerequisite:* College physics, algebra, trigonometry, and analytic geometry.

301. Soil Mechanics

Year, 3 credits each semester

EDWARD S. BARBER

Theory and practical applications of soil mechanics to the engineering problems of foundations, dams and embankments. Course designed to familiarize general engineers with problems connected with soils and methods of foundation investigation and laboratory tests available for solving these problems. Foundation investigation methods described include: core drilling, auger boring, test pit digging, record keeping and collection and protection of samples. Laboratory tests to be described include: general classification, permeability, consolidation, compaction, shear and triaxial compression. Laboratory facilities are available for demonstration. *Prerequisite:* Degree in engineering.

552. Recent Developments in Materials Engineering

Spring, 2 credits (alternate years)

DANIEL KLATZKO, MEYER HANSON, and COMMODITY EXPERTS

Designed to acquaint engineers, technologists and others engaged in any phase of materials engineering, such as purchasing, supply, standards, and speci-

fications, with recent developments in plant production of basic materials. Prominent specialists from production departments of some of the leading industrial corporations will participate as guest lecturers. Short films will be used to portray pictorially the discussion. Among the subjects covered will be aluminum and aluminum products, steel, lumber, concrete, petroleum products, detergents, plastics, ceramics, insulating and roofing materials, paints, rubber, leather, and textiles. *Prerequisite:* College degree or equivalent, or consent of instructors.

[553.] Engineering in Materials Supply Operations (1950–51 and alternate years)

WILLIS S. MACLEOD

554. Protecting Engineering and Scientific Developments Through Patents

Spring, 2 credits (alternate years)

ALBERT J. KRAMER

This course is intended to supply the need of engineers and scientists for practical information concerning inventions and patents. Beginning with a discussion of the need of patent protection in our competitive economy, the course will cover: a review of the United States patent system; the steps that an inventor should take to protect his invention; analyses of some important historical patents; how to interpret patents for novelty and infringement; how patents, trade marks, and copyrights are distinguished; what rights employees and employers have to inventions made by the employees; how patent rights may be dealt with; how to determine inventorship among co-workers; how to determine patent priorities between independent inventors; the elements of inventive intelligence; and other matters of particular importance to engineers and scientists, especially those in the Government service. *Prerequisite:* Degree in one of the sciences, or equivalent, or consent of the instructor.

DIVISION OF SURVEYING AND MAPPING

COMMITTEE ON SURVEYING AND MAPPING

MARSHALL S. WRIGHT (Chairman)

WARREN C. CRUMP
GEORGE H. EVERETT
W. S. HIGGINSON
J. E. KING
GUILLERMO MEDINA
ALBERT L. NOWICKI

HOWARD S. RAPPLEYE
A. L. SHALOWITZ
G. C. TEWINKEL
PAUL D. THOMAS
H. W. WHITLOCK
ARCHER M. WILSON

Maps have played an important part in human progress. Today, as never before, they furnish the basis for both military and non-military activities throughout the world. Greater use of maps has brought increasing demand for persons qualified in each of the technical phases of map production and reproduction.

The purpose of the curriculum in surveying and mapping is to offer basic training for those persons who are engaged in the technical and supervisory aspects of map making. The curriculum is intended to give the student a broad knowledge and basic understanding of each of the separate phases of the science; to enable him to understand better the problems, possibilities, and limita-

tions of each of the phases. He can then better plan his own activities toward the economical production of accurate maps. A large part of the curriculum is devoted to geodesy, a subject considered to be of increasing importance in view of modern rapid means of world-wide travel, the consequent need for world-wide charts, and the development of new methods in surveying.

At least two years' work toward a degree of Bachelor of Science in Civil Engineering is considered as being the logical background for the curriculum in surveying and mapping, although one who has completed the sophomore year in engineering normally would have fulfilled the usual prerequisites. Many other potential students will also find that they may have already fulfilled all or nearly all the prerequisite studies. It should be emphasized that Calculus and College Physics are desirable prerequisites for advanced courses. Persons who are planning a career in this field are urged to arrange their schedules so as to include these courses at the earliest opportunity.

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[215.] **Route Surveying** (1950-51 and every third year)

HOWARD S. RAPPELVE

[216.] **Ground Methods of Topographic Surveying** (1950-51 and every third year)

HOWARD S. RAPPELVE

[217.] **Astronomy for Engineers** (1951-52 and every third year)

HOWARD S. RAPPELVE

218. Geodetic Surveying

Fall, 3 credits (every third year)

HOWARD S. RAPPELVE

Theory and practice of first and second order triangulation, traverse, leveling; base line measurement; triangulation measurements, geodetic leveling, the use of repeating and direction theodolites, precise leveling equipment; computations as might be made by field parties prior to office computation and adjustment. *Prerequisite:* Ground Methods of Topographic Surveying or equivalent, or permission of instructor.

219. Computation and Adjustment of Geodetic Observations

Spring, 3 credits (every third year)

HOWARD S. RAPPELVE

The office computational forms and procedures that follow astronomical and geodetic observations introduced in Courses 217 and 218. *Prerequisite:* Astronomy for Engineers and Geodetic Surveying or equivalent, or permission of instructor.

20. Introduction to Photogrammetry

Fall, non-credit

ARTHUR H. FAULDS

Lectures and demonstrations in non-technical terms cover: the history and development of photogrammetric engineering; the importance of optics; basic

principles of photography; types of aerial photography, aerial cameras, accessory equipment, and photographic aircraft; requirements of coverage, flight lines, tilt, and scale; photo interpretation and stereoscopes; requirements of horizontal and vertical control; radial plot and stereoscopic plotting instruments. Designed for persons who use aerial photographs in military planning and operations, high-way development, agricultural land use and conservation, mineral and petroleum exploration, and in other engineering and industrial operations.

212. Photogrammetry I

Fall, 2 credits

W. S. HIGGINSON

Basic optics; basic geometric characteristics of aerial photographs; flight planning; basic photography and laboratory practices; photographic materials; aerial cameras; camera mounts. *Prerequisite:* College plane trigonometry.

213. Photogrammetry II

Spring, 2 credits

W. S. HIGGINSON

Radial line plotting methods, mosaics, determination of elevations from photographs, photo-interpretation. *Prerequisite:* Photogrammetry I.

370. Photogrammetry III

Fall, 2 credits (alternate years)

G. C. TEWINKEL and BERNARD J. COLNER

Geometry of the tilted photograph, the oblique, and the horizontal; introduction to tilt determination and analytic computations; practice with the multiplex. *Prerequisite:* Photogrammetry II.

371. Photogrammetry IV

Spring, 2 credits (alternate years)

G. C. TEWINKEL and BERNARD J. COLNER

Practice with multiplex; stereoscopic plotting instruments; rectification; the use of horizontal and oblique photographs; the photo alidade. *Prerequisite:* Photogrammetry III.

25. Introduction to Cartography

Spring, non-credit

STEPHEN M. JOHNSON

This course will introduce the student to the field of cartography and the problems that are involved in the compilation, production, and uses of maps. Subjects included are: history of maps; the geographic framework of maps; the significance of map scale; descriptions of the various methods of mapping; reading the map content; map programs of the various Federal agencies; map research problems; and general extent of mapping throughout the world.

214. Cartography

Year, 2 credits each semester

GEORGE H. EVERETT

The first semester includes studies in the fundamental principles of cartography, the application of these principles in the execution of basic surveys; classification of earth's features and their significance to the problems of map interpretation; use of symbols and tints in the delineation of map data; detail study of survey maps. Special topics include: reference coordinates; reference spheroids; map datums; purpose and use of geodetic survey data; scale problems; interpretation and application of survey data for map publication.

The second semester includes studies in special map series which are projected for world coverage and studies in nautical and aeronautical chart series. Studies will include the problems of the special projections employed, methods of construction from special tables, interpretation of source materials; problems of compilation and composition; methods of reproduction. *Prerequisite:* College plane trigonometry.

240. Methods of Map Reproduction

Spring, 2 credits (alternate years)

M. S. A. DELANEY and SPECIALISTS

Photography including wet plate, dry plate and film; photostat, ozalid, blue-print, etc.; process plate making including plastics; negative engraving and lithographic drafting; transferring; type composition for maps; copper plate engraving and plate printing; presswork, single and multicolor; layout and film assembly; inks and papers; binding and finishing. Lectures by lithographic experts from government and industry.

[430.] Map Projections (1950-51 and alternate years)

JOHN A. O'KEEFE

440. Theory of Geodesy

Year, 2 credits each semester (alternate years)

PAUL D. THOMAS

Mathematical derivation of the formulas for latitude, longitude and azimuth; determination of geodetic position; properties of the spheroid; figure of the earth; theory of gravity effects; theory of orthometric correction due to the convergence of level surfaces with respect to precise leveling; basic theory of map projections.

Prerequisite: Calculus and courses in advanced surveying.

DIVISION OF FINE ARTS AND ARCHITECTURE

GILBERT STANLEY UNDERWOOD (Chairman)

322. Survey of Art

Fall, 2 credits

CHARLES M. RICHARDS

The course is designed to establish the basic values which underlie artistic achievement and to develop an appreciation of these values before the objects themselves. From age to age these basic values—the aesthetic values—remain the same. The lectures will attempt to relate the major epochs to one another so as to indicate the continuity of art history and at the same time contrast the variant forces and ideas which produced such differing styles and expressions.

334. Modern Painting

Spring, 2 credits

CHARLES M. RICHARDS

This course begins with a study of the art of the outstanding masters of the 17th Century and of the general current of painting in that century, with emphasis on the development of painting through the National Schools and styles up to the present moment. The main concern will be to arrive at an understanding and appreciation of impressionism and post-impressionism.

321. Pencil Sketching and Freehand Drawing

Fall, 2 credits. Repeated in Spring and Summer

WALTER G. CADMUS, JR.
ROWLAND LYON

Study of shade, shadows, and perspective. An intensive study of theory, harmony of lines, and pictorial and outdoor sketching. Each student receives individual criticism. Open to both beginners and advanced students.

323. Portrait Painting in Oil

Fall, 2 credits. Repeated in Spring and Summer

PIETRO LAZZARI

To enjoy this course the student need not have experience as an artist but must have the desire to achieve proficiency in portraiture.

Professional methods of painting oil portraits incorporating the basic tech-

niques of the old masters and the spirit of modern art. Course includes, sketching, line composition and light arrangement; color, theory and technique of painting in oil. All work done from life.

320. Water Color Painting

Fall, 2 credits. Repeated in Spring

ROWLAND LYON

Theory and practice; painting from landscape and still life.

230. Interior Decoration—I

Fall, 1 credit. Repeated in Spring

CAMILLA MOODY PAYNE

Principles of color, line and design; choice and use of accessories; planning draperies and slipcovers; selection of rugs. Fabrics, photographs and diagrams used to supplement lectures.

231. Interior Decoration—II

Fall, 1 credit. Repeated in Spring

CAMILLA MOODY PAYNE

Study of period and contemporary furniture and its adaptability to modern living. Particular attention will be given to general characteristics of each period including: decoration, color, floor coverings, upholstery and drapery fabrics, and accessories. Lectures illustrated.

316. Landscape Design—Small Property

Fall, 2 credits

JOSEPH C. GARDNER

The purpose of this course is to encourage and direct the creative impulse of the person interested in the landscape development of the small property, thus creating more interest and pleasure in the home. The course will include an outline of the basic principles of land planning and their application to the design of the small property, with discussion of the principles of composition in relation to the selection and use of plants and other materials. The practical application of landscape design principles to specific problems. A discussion of the physical aspects of landscape development including construction methods, horticultural standards and maintenance requirements. Each member of the class will be required to submit a statement concerning his program for the plan and development of his property or property of his selection.

[318.] City Planning and Urban Development

324. Basic Mechanical Drawing I

Fall, 2 credits

LEO G. D. WIEMER

The use of drawing instruments. Lettering and dimensioning. Problems in conventional presentation of objects by means of lines, including geometrical problems, orthographic projection and auxiliary projection. One hour lecture and three hours drafting room work each week.

325. Basic Mechanical Drawing II

Spring, 2 credits

LEO G. D. WIEMER

Advanced instruction in the elements taught in Basic Mechanical Drawing I. Developments and intersections. One hour lecture and three hours drafting room work each week. *Prerequisite:* Basic Mechanical Drawing I or equivalent.

340. Architectural Drafting I

Fall, 2 credits

LEO G. D. WIEMER

Frame house construction. Study of wood framing and related building materials; arrangement of rooms and furniture; the economy of good construc-

tion. Drawing of plans and elevations of a frame residence from sketches. One hour lecture and discussion and three hours drafting room work each week. *Prerequisite:* Basic Mechanical Drawing II or equivalent.

341. Architectural Drafting II

Spring, 2 credits

LEO G. D. WIEMER

Large scale drawing of exterior and interior details for the frame residence studied in Architectural Drafting I. One hour lecture and discussion and three hours drafting room work each week. *Prerequisite:* Architectural Drafting I or equivalent.

342. Architectural Drafting III

Fall, 2 credits

LEO G. D. WIEMER

Study of masonry construction and related building materials. Site plan study and drawing. Preparation of plans and elevations of a masonry building from sketches. One hour lecture and discussion and three hours drafting room work each week. *Prerequisite:* Architectural Drafting II or equivalent.

343. Architectural Drafting IV

Spring, 2 credits

LEO G. D. WIEMER

Large scale drawing of exterior and interior details for the masonry building studied in Architectural Drafting III. Outline study of the Orders of Architecture. One hour lecture and discussion and three hours drafting room work each week. *Prerequisite:* Architectural Drafting III or equivalent.

305. Elements of Statistical Drafting

Year, 2 credits each semester

NELSON P. GUIDRY

A practical course in drafting involving actual preparation of statistical maps and charts in class. Explanations of short cut methods of lettering technique and arrangement of component parts of illustrations. Complete illustrations will be prepared in ink ready for publication. The reduction, reproduction, and color application to statistical maps and charts will be explained.

DIVISION OF TECHNICAL ARTS

COMMITTEE ON TECHNICAL ARTS

R. G. HAINSWORTH (Chairman)

SAYDE F. ADELSON
EDWARD S. COBB
DOROTHY NICKERSON

ELBRIDGE C. PURDY
DANA D. REYNOLDS
MARY A. ROKAHR

188. Glass Blowing

Year, 2 credits each semester

L. B. CLARK, SR.
L. B. CLARK, JR.

A laboratory course for technicians. Simple manipulation of joining, bending, and shaping is carried through to the production of useful apparatus. Metal in glass and glass to metal seals of all types are made. During the first semester the soft glasses are utilized for practice; during the second semester the related glasses are used. Ample opportunity for advanced work is given those who show themselves particularly adapted to the work. (New students may be admitted in the Spring if space permits.)

329. Home Gardening

Spring, 2 credits

WILBUR H. YOUNGMAN

A lecture and discussion course in the fundamentals of gardening for the amateur. Beginning with a discussion of design, the course briefly covers the

preparation of soil, selection of plant materials, planting, cultural practices, protection from insects and diseases and pruning and propagation of shrubs for the home garden. The home production of vegetables and fruits will be discussed briefly with emphasis on culture under Washington conditions.

260. Introduction to Modern Color Technology

Fall, 2 credits

JOSEPHINE G. BRENNAN

An introduction to the basic phenomena, laws, and characteristics of color. The course is designed for persons concerned with color, whether as an artist, photographer, illuminating engineer, information or extension specialist, or specialist in other technical fields. Topics to be studied, in the review of the physical, physiological, and psychological aspects of color, include: appearance characteristics of color and methods of specification of those characteristics; the psychological attributes and phenomena of color; the physical properties and the production of color and color mixtures, including light sources and filters; and color vision and types of color vision deficiencies. Examples of the application of this information to actual work problems will be presented throughout the course.

234. Modern Homemaking for Employed Men and Women

Fall, 2 credits

SAYDE ADELSON and SPECIALISTS

Selected specialists in a series of popular lectures will give up-to-the-minute and practical information on homemaking for the busy family. Topics covered will include: menu planning; food buying; choice of household equipment and furnishings; everyday care of the house; functional arrangement of house furnishings and work simplification methods; clothing, selection and care; management of time and money; and child guidance and family cooperation. A question and answer period following each lecture will provide opportunity for class members to get some help with individual problems.

COMMITTEE ON PHOTOGRAPHY

R. G. HAINSWORTH (Chairman)

EDWARD S. COBB
P. J. DALY
RAYMOND DAVIS
R. J. LEFEBVRE
KEITH B. LEWIS

ALBERT R. MATERAZZI
JAMES H. MCCORMICK
ELBRIDGE C. PURDY
ROY M. REEVE
LYNN R. WICKLAND

70. Popular Photography

Fall, non-credit. Repeated in Spring and Summer

WILLIAM C. MCHENRY

This is a lecture, demonstration course of a non-technical nature. It is intended particularly for those camera enthusiasts who desire a clearer understanding of how their cameras, films and prints work. Better pictures should be the result of taking this course. Topics covered: camera types and operation; film types and uses; developing and printing; filters; exposure; planning, composition and lighting; portraiture; motion pictures; color photography. Exhibition and demonstration of equipment, materials and techniques supplement class lectures and discussion.

192. Fundamentals of Photography I

Fall, 2 credits. Repeated in Spring

ROBERT A. KOCH

This course forms a foundation for all of the other courses in photography. It offers a thorough grounding in elementary optics, physics, chemistry and composition as related to basic photographic operations. Topics covered: lenses, their make-up and function; characteristics of negative emulsions and printing

papers; methods of correct exposure; the theory of development; fixing and washing processes; fundamental concepts of composition; and principles and uses of filters.

193. Practice of Photography I

Fall, 2 credits. Repeated in Spring

JAMES A. BEALES

This course furnishes laboratory practice and demonstration of the principles taught in Fundamentals of Photography I. It offers the student an opportunity to become familiar with recommended procedures and techniques. Topics covered: contact printing and processing; selection of printing papers; processing of negative roll film, cut film and film pack; diagnosis and remedy of processing defects; types of cameras, their operation and uses, and the application of filters. This course may be taken concurrently with Fundamentals of Photography I. *Prerequisite:* Fundamentals of Photography I.

194. Fundamentals of Photography II

Spring, 2 credits

EDWARD S. COBB

A continuation of Fundamentals of Photography I. Subjects included are: practical sensitometry and gradation control; the theory of projection printing; line and mass in picture arrangement; the nature of photographic light, its characteristics, control and measurement; shutter types and their performance; chemistry of photographic processes and the use of color film. *Prerequisite:* Fundamentals of Photography I.

195. Practice of Photography II

Spring, 2 credits

JAMES A. BEALES

A continuation of Practice of Photography I. Subjects included are: application of sensitometric measurements, projection printing, print correction, composite printing, lighting, rendition of form and texture, light patterns, principles of portraiture, the effect of light on color, retouching, toning and print analysis. *Prerequisite:* Practice of Photography I.

270. Color Photography I—Camera Techniques

Fall, 2 credits

HARVEY B. MOHR

Covers the general camera techniques of color photography and the use of current materials and equipment. Instruction in lighting, exposure, color balance and processing of monopack materials such as AnscoColor and Kodachrome; the use of the one-shot camera and the making and processing of direct color separations; practical masking methods for color transparencies and an introduction to color printing with the Printon Process. Lectures and supervised studio and laboratory demonstrations. *Prerequisite:* Fundamentals of Photography II and Practice of Photography II or equivalent in training and experience.

271. Color Photography II—Printing Techniques

Spring, 2 credits

HARVEY B. MOHR

Designed to cover in detail the Dye-Transfer and Printon method of color printing. Instruction and laboratory work in the production of separation negatives from transparencies; characteristics and processing of Printon; masking techniques; matrix film development; registration problems; dye balance control; and transfer technique. Lectures and supervised laboratory work. *Prerequisite:* Color Photography I.

[307.] **Advanced Color Photographic Theory** (1951–52 and every third year)

360. Portrait Photography

Year, 2 credits each semester

ELBRIDGE C. PURDY

A studio and darkroom course that provides opportunity for practice. The student learns through individual guidance the subtleties of fine portrait work. Lighting, posing, composition, processing and re-touching. *Prerequisite:* Practice of Photography II.

011. Photographic Seminar

Year, non-credit

ELBRIDGE C. PURDY and OFFICERS OF THE SEMINAR

The Photographic Seminar has been formed to provide opportunity for the continued study of photography. The Seminar meets twice each month during the regular school year. One meeting is devoted to constructive analysis of photographic work presented by Seminar members; the other meeting is devoted to presentation of information about new developments and techniques in photography and to other topics of current interest. The Seminar sponsors an Annual Salon.

Registration is open to persons who have completed any of the courses in photography offered by the Graduate School. No fee is charged; registration, however, is required.

Faculty

FACULTY, DEPARTMENTAL AND SPECIAL COMMITTEES, AND PUBLIC LECTURERS

* Faculty † Special Committee ° Special Public Lecturers
‡ Departmental Committee or Sub-committee

- °EMILIO ABELLO, Bachelor of Law, University of the Philippines. Minister Plenipotentiary, Embassy of the Philippines. Taught in private universities in Manila and professional lecturer at University of the Philippines. (Social Sciences)
- °N. G. ABHYANKAR, B.A. Honors Degree, Bombay, M.Sc. [Econ.], London School of Economics. Food Counselor for the Embassy of India. (Social Sciences)
- *LAURENCE W. ACKER, C.P.A. Systems Accountant, General Accounting Office. Taught in Tyler Commercial College. (Public Administration)
- *EVA B. ADAMS, M.A., Columbia. Administrative Assistant to Senator McCarran of Nevada, U. S. Senate. Taught in Nevada. (Public Administration)
- †RUSSELL B. ADAMS, Member, Civil Aeronautics Board. (Social Sciences)
- ‡ROBERT E. ADCOCK, M.S., Oklahoma A. and M. Chief, Training Section, Personnel Division, Production and Marketing Administration, USDA. Taught in Oklahoma A. and M. and Cameron State Agricultural College. (Committee on Correspondence Study and Extension Education)
- *†SAYDE F. ADELSON, M.A., California. Technical Assistant to the Chief, Bureau of Human Nutrition and Home Economics, Agricultural Research Administration, USDA. (Technology)
- °GEORGE V. ALLEN, M.A., Harvard. Assistant Secretary of State for Public Affairs, Department of State. (Social Sciences)
- *†BUSHROD W. ALLIN, Ph.D., Wisconsin. Chairman, Outlook and Situation Board, Bureau of Agricultural Economics, USDA. Taught in Wisconsin. (Social Sciences)
- *TEN M. F. ALLSMAN, Head, Reporting Systems Branch, Administrative Office, Department of the Navy. (Office Techniques)
- *A. AMIRIKIAN, C.E., Cornell. Head Designing Engineer, Bureau of Yards and Docks, Department of the Navy. Taught in Catholic and George Washington. (Technology)
- *†ELIN ANDERSON, M.A., Columbia. Specialist in Rural Health Services, Extension Service, USDA. Taught in Nebraska and Vermont. Author, "We Americans" and "Do We Want Public Health?" (Social Sciences)
- *LOUIS H. ANDERSON, LL.B., Washington College of Law. Director of Production, McGregor and Werner, Inc. (Languages and Literature)
- †PAUL L. APPELMAN, Examiner in Accounting, Civil Service Commission. (Public Administration)
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Index

- Accident prevention, 72
- Accounting, 49, 76-77
- Accounting, Division of, 75-78
- Accrediment, 12
- Administration Board, 3
- Administration, Graduate School, 6-7
- Administrative law, 73
- Administrative management, 67
- Administrative procedures, 46, 48
- Aerodynamics, 107
- Agricultural cooperation, 89
- Agricultural policies, 89-90
- Algebra, 38, 42
- American foreign relations, policies, and practices, 99-100
- Anthropology, cultural, 91
- Antibiotics, 21
- Architecture and Fine Arts, Division of, 111-113
- Architecture, naval, 106
- Art, survey, 111
- Asia, southeast, 102
- Audio-visual aids, 25
- Auditing, 48-49

- Balkans and Middle East, 101-102
- Beltsville Graduate School Committee, 4
- Biochemistry, 56
- Biological Sciences, Department of, 19-21
- Biology, 19-20
- Birds, D. C. area, 20
- Books, great (classics), 23
- Botany, systematic, 20
- Budgetary and Financial Administration, Division of, 70-71
- Budgetary procedure, 49
- Bureau of Standards, courses, 41, 60
- Business law, 77
- Business mathematics, 48

- Calendar, inside front cover
- Calculus, 38, 39
- Cartography, 110
- Catholic University of America, 97
- Certification, 13
- Certified statements of accomplishment 13, 34-35, 46-47, 64-67, 75-76, 86-87
- Chemistry, 55, 56
- Climatology, 59
- Color technology, 114
- Communications and transportation, 102-104
- Community relations, sociology and psychology, 94
- Computing machines, electronic, 43
- Congressional administrative operations, 69
- Conservation, soil, 57
- Consumer cooperation, 96
- Consumption economics, 95-96
- Cooperation with educational institutions, 9, 97
- Cooperative extension education, 94-95
- Cooperative internship program, 9-10
- Correspondence Study, Committee on, 4
- Council, Graduate School, 3
- Counseling services, 11
- Creative writing, 26-27
- Criminal evidence and procedure, 74
- Cultural regions, U. S., 94

- Decoration, interior, 112
- Degree requirements, 12-13
- Demographic methods and techniques, 44
- Drafting, 112-113
- Drawing, 111, 112

- Economic relationships, 44
- Economic thought, 84-85
- Economics—
 - agricultural, 85-90
 - consumption, 95-96
 - general, 83-85
 - medical, 97
- Editing, 26
- Electrification, area systems, 106
- Electronic computing machines, 43
- Employee relations and services, 73
- Engineering, Division of, 106-108
- English composition, 22
- English drama, 23
- English for foreign students, 23
- English grammar, 23
- English usage, 23
- English vocabulary building, 23
- Entomology, medical and veterinary, 21
- Estimating procedures, 44
- Extension Education, Committee on, 4
- Extension education, cooperative, 94-95

- Facilities, Committee on, 4
- Faculty, 117-133
- Faculty, original staff, 10-11
- Far East, 102
- Farm structures, 96
- Finance, agricultural, 87, 88
- Finances, government, 84
- Finances, personal, managing, 95
- Financial and Budgetary Administration, Division of, 70-71

- Fine Arts and Architecture, Division of, 111-113
- Foreign languages—
 Arabic, 29
 Chinese, 29
 Czech, 29
 Dutch, 29
 French, 30
 German, 30-31
 Greek, 29
 Hindu, 29
 Italian, 31
 Japanese, 29
 Malay, 29
 Polish, 29
 Russian, 31
 Spanish, 32
- Foreign relations, American, 99-100
- Fungicides, new developments, 21
- Gardening, home, 113-114
- Geodetic surveying, 109
- Geodesy, theory, 111
- Geography and geology, 56-57
- Geometry, 39
- Glass blowing, 113
- Government printing procedure, 27
- Government supply, 74-75
- Government-Public Relationships, Division of, 69-70
- Graduate degree requirements, 12-13
- Graphic methods, 25, 40
- Group relations, sociology and psychology, 94
- Health and medical services, 96-97
- History and objectives, Graduate School, 5-6
- Home gardening, 113-114
- Homemaking, 114
- Housing and farm structures, 96
- Human relations, 90-94
- Hydrology, 59
- Indexing, 27
- Information, general, 5-13
- Information media, 25
- Insurance and risk, 87
- Interior decoration, 112
- Internal Audit, Committee on, 4
- International financial and trade policies, 85
- International relations, 98-102
- Internship Cooperation, Committee on, 4
- Internship program, cooperative, 9-10
- Internships, sampling, 35, 37-38
- Labor, farm, 91
- Labor force, U. S., 92
- Landscape design, 112
- Languages and Literature, Department of, 22-32
- Languages, foreign, 28-32
- Law, administrative, 73
- Law, business, 77
- Lectures, 8-9, 89, 93, 99, 100
- Legal Administration, Division of, 73-74
- Legislative process, 69
- Letter writing, 51-52
- Library facilities, 11-12
- Library service, 28
- Library techniques, 28
- Library trends, 28
- Literature and Languages, Department of, 22-32
- Machine tabulation, 41
- Machines, computing, 43
- Management, 67, 68
- Map reproduction methods, 111
- Mapping and Surveying, Division of, 108-111
- Marketing, 88
- Maryland, University of, 9
- Materials engineering, 107
- Mathematics, 38-40
- Mathematics and Statistics, Department of, 33-45
- Measure, theory of, 45
- Mechanical drawing, 112
- Medical economics, 97
- Medical services and health, 96-97
- Metallurgy, 58
- Meteorology, 58-60
- Middle East and Balkans, 101-102
- National cultures, 93
- National Government, 67
- Naval architecture, 106
- Nursing, public health, 97
- Office management, 51
- Office Techniques and Operations, Department of, 46-54
- Officers, 3
- Ore deposition, 57
- Organization and Methods Analysis, Division of, 70
- Painting, 111-112
- Patents, 108
- Personal development, 28
- Personnel Administration, Division of, 71-73
- Personnel procedure, 50-51
- Persuasion, principles of, 24
- Philosophy, 90-91
- Photogrammetry, 109-110
- Photography, 114-116
- Physical Sciences, Department of, 55-60
- Physics, 60
- Physiography of U. S., 57
- Plants, identification, 20

- Plays, great (English), 23
 Policies affecting agriculture, 100
 Population, 91, 92
 Position classification, 72
 Power transmission systems, 106
 Printing procedure, 27
 Procedure systems, 52
 Procedures, estimating, 44
 Procurement and Property Management, Division of, 74-75
 Program, Graduate School, 7-8
 Programming, linear, 43
 Property Management and Procurement, Division of, 74-75
 Property procedure, 50
 Psychology—
 child and adolescent, 92
 general, 90
 social, 92
 Public Administration, Department of, 61-78
 Public health nursing, 97
 Public information media, 25
 Public relations, 69
 Public speaking, 24
 Publications, Committee on, 4
 Publications, Graduate School, 10, back cover
 Purchasing procedure, 50
- Radio writing and speaking, 25
 Records management, 51
 Regulations and procedures, Graduate School—
 admission, 14
 attendance, 15-16
 classification of courses, 15
 credit and grades, 16
 entrance requirements, 14
 fees, 17
 payment of fees, 17
 prerequisites, 14
 refund of fees, 17-18
 registration, 15
 room assignments, 18
 textbooks, 18
 transfer of credit, 16
 withdrawal, 16
 veterans, 14
 Reports, statistical, 44
 Resident educational program in Washington, 8
 Risk and insurance, 87
 Rural electrification, 106
 Rural sociology, 91-92
 Russia, 101
- Safety engineering, 72
 Sampling, internships, 35, 37-38
 Sampling surveys, 42, 45
 Semantics, general, 91
 Seminars, 9, 25, 45, 85, 88, 90, 93, 99-100, 116
 Sketching, 111
 Shorthand, 52-54
 Social Sciences, Department of, 79-104
 Sociology, general, 90
 Sociology, rural, 91-92
 Soil mechanics, 107
 Soil sciences, 57-58
 Speaking, 24
 Speech, 24-25
 Standards, Bureau of, courses, 60
 States, relations between, 101
 Statistics, 40-45
 Statistics and Mathematics, Department of, 33-45
 Summer session, inside front cover
 Supplies, Governmental, 74-75
 Surveying and Mapping, Division of, 108-111
 Surveys, sampling, 42, 45
- Tabulation, machine, 41
 Tax accounting, Federal, 77
 Technical Arts, Division of, 113-115
 Technology, Department of, 105-116
 Television programming, 25
 Tenure, farm, 91
 Tests and measurements, 72
 Textbooks, 18
 Traffic management, 103
 Transmission systems, power, 106
 Transportation and communications, 102-104
 Trigonometry, 38-39
- United Nations, organization and functions, 101
 United States and world affairs, 99
 University of Maryland, 9
- Veterans, 14
 Visual aids in information, 25
 Vocabulary building, 23
- Weather analysis and forecasting, 59-60
 Welded structures, theory and design, 107
 Work standards and measurement, 68-69
 World affairs and U. S., 99
 World agriculture, 88
 World politics, current problems, 100-101
 Writing—
 creative, 26-27
 interpretive, 27
 letter, 51-52
 official, 27
 procedures and instruction, 52

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